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PENSOFT

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Taxonomy of the genus *Microichthyurus* Pic (Coleoptera, Cantharidae, Chauliognathinae), with descriptions of nine new species from China

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Abstract

The genus *Microichthyurus* Pic, 1919, from China and its adjacent areas is reviewed. *M. robusticeps* Pic, 1923 (Laos and Vietnam), is redescribed. Nine new species are described from southern China, including *M. falcatus* **sp. nov.**, *M. quadratus* **sp. nov.**, *M. crassicornis* **sp. nov.**, *M. niger* **sp. nov.**, *M. tertius* **sp. nov.**, *M. guangxiensis* **sp. nov.**, *M. flavipennis* **sp. nov.**, *M. bimaculatus* **sp. nov.**, and *M. strictipennis* **sp. nov.** These species are illustrated with habitus and genital segments of both sexes, as well as aedeagi. Four species groups are defined, and each is provided with a key for species identification and a distribution map.

Key Words

Alpha taxonomy, Ichthyurini, Oriental Region, soldier beetles, species groups

Introduction

The soldier beetles of the tribe Ichthyurini Champion, 1915, are quite diverse in China but were poorly studied there in the past. Some genera are well known to occur in the adjacent parts of the East Palaearctic and Oriental Regions but are poorly recorded in China, such as *Microichthyurus* Pic, 1919. Prior to our study, the majority of previously known species were found in the Sundaland area of the Oriental Region, with a few found in Japan, northern Vietnam, southern India, Nepal, Bhutan, and China (Delkeskamp 1977; Kazantsev and Brancucci 2007; Brancucci 2009; Takahashi 2020; Lin et al. 2024a, 2024b). To date, a total of 56 species are included in this genus (Lin et al. 2024b). However, more species from southern China remain to be discovered and will be described in the present study. As more and more species are recognized, it becomes increasingly necessary for us to subdivide the genus to facilitate its taxonomy. The findings will not only give us a better understanding of the species diversity of *Microichthyurus* but also provide a preliminary classification for this genus.

Materials and methods

The studied material is preserved in the Institute of Zoology, Chinese Academy of Sciences, Beijing, China (IZAS), and the Museum of Hebei University, Baoding, China (MHBU).

The specimens were initially softened in water, followed by the dissection of the genitalia and genital segments of both sexes. Subsequently, the male genitalia were immersed in a 10% NaOH solution and then placed in a metal bath warmed to 90 °C for one minute. After that, the cleaned male genitalia were examined and photographed in glycerol before being affixed to a paper card for permanent preservation. The female genitalia were stained with hematoxylin, examined in 75% alcohol, and preserved in glycerol. For species exhibiting multiple distributions, dissections of both female and male specimens were conducted for comparative analysis across these distributions. In cases where any damage occurred during dissection, additional specimens would be treated as necessary. Images of the adults were taken

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with a Canon EOS 80D digital camera, while those of the genitalia were captured using a Leica M205A stereomicroscope. These images were subsequently stacked using Helicon Focus 7 software, and the final plates were edited in Adobe Photoshop 2020.

For the specimens, all labels originally written in Chinese have been transliterated into English. Morphological terminology used in this study primarily adheres to the conventions established by Brancucci (1980). The only exception is the French "bride tergale," which has been translated into English as "tergal flange." Body length is measured from the front of the head to the apices of lateral projections of abdominal tergite VIII, and body width is across the elytral humeri. Interocular distance is recorded at the minimal point between eyes, while the diameter of an eye corresponds to its maximal width.

Taxonomy

Class Insecta Linnaeus, 1758
Order Coleoptera Linnaeus, 1758
Superfamily Elateroidea Leach, 1815
Family Cantharidae Imhoff, 1856
Subfamily Chauliognathinae LeConte, 1861
Tribe Ichthyurini Champion, 1915
Genus *Microichthyurus* Pic, 1919

Microichthyurus robusticeps Pic, 1923

Figs 1A, B, 2A, B, 3A, 4A–D, 5A, B

Microichthyurus robusticeps Pic, 1923: 57.

Material examined. Vietnam • 1 ♂ 1 ♀; Tonkin; Hoa-Binh; A de Cooman leg.; IZAS. LAOS • 1 ♂ 3 ♀♀; Vang Viene; 27-VI-2015; Haoyu Liu leg.; MHBU • 2 ♂♂ 2 ♀♀; Phon Khao Khouay National Bio-Diversity; 160 m; 29-VI-2015; Haoyu Liu leg.; MHBU.

Re-description. Body length (both sexes): 3.5–3.8 mm; body width (both sexes): 0.8–0.9 mm.

Male (Fig. 1A). Coloration. Body black, head and pronotum with blue metallic luster; antennomeres I–III yellow; elytra gray at apical 1/3 parts; legs gray at coxae and trochanters; abdomen light yellow at anterior and posterior margins of ventrites II–VI.

Eyes strongly large, interocular distance about half as wide as diameter of an eye, head width across eyes distinctly wider than anterior margin of pronotum. Antennae extending to posterior margin of abdominal tergite IV, antennomeres II–III, V, and VII subequal in length and about half length of I, III–IV, and VIII–X cylindrically thickened, IV about 0.8 times as long as III, VI about 1.2 times as long as V, VIII–X progressively shortened, XI fusiform and about twice longer than X.

Pronotum 1.2 times wider than long, anterior margin slightly arcuate, posterior margin strongly bisinuate, lateral margins slightly converging posteriorly, anterior angles rounded, and posterior angles nearly rectangular. Elytra as long as wide, 1.5 times longer than pronotum, with lateral margins subparallel, sutures strongly dehiscent from the base, distance between sutures nearly as wide as width of the elytron, apices rounded.

Abdominal tergite VIII (Fig. 2A) about 1.1 times longer than wide, with lateral margins nearly straight, postero-lateral projections about 1/3 length of the tergite and nearly straight at inner margins. Abdominal sternite VIII (Fig. 2B) bilobed, with lateral portions converging posteriorly to each other, sickle-shaped and acute at apices, slender and 4.0 times as long as basal width, bisinuately emarginate at basal parts of inner margin, where covered with a few erected and stout setae. Proctiger (Fig. 3A) peach-like, completely surrounded by paraproct, covered with some slightly long setae on surface. Paraproct (Fig. 3A) well-developed, narrowed posteriorly, and shallowly emarginate at posterior margin, covered with a few long setae, with tergal flange extremely long, almost 4.0 times as long as paraproct, slightly wider at base, and bent inwards.

Aedeagus (Fig. 4A–D): left ventral paramere rod-like, straight and slender, slightly swollen at apex (Fig. 4A, B); left dorsal paramere about 1.3 times as long as left ventral paramere, very slender and spiral, acute at apex (Fig. 4C); right paramere short and lamellar, about 2/5 length of left ventral paramere, widely rounded at apical margin (Fig. 4C); median lobe moderately sclerotized, grooved at basal part and conical tube-shaped at apical half, rounded at apex, about half length of parameres (Fig. 4A, B); internal sac elongate tube-shaped, on which surface densely covered with numerous short setae.

Female (Fig. 1B). Similar to males, but antennae simple and filiform. Abdominal tergite VIII (Fig. 5A) about 1.2 times longer than wide, with lateral margins arcuate, lateral projections about 1/4 length of the tergite and slightly arcuate at inner margins. Abdominal sternite VIII (Fig. 5B) about 1.1 times longer than wide, with lateral margins moderately converging posteriorly, posterior margin nearly straight, and latero-apical angles rounded.

Distribution. Laos, Vietnam.

Remarks. Although the type of this species was not located in Muséum national d'histoire naturelle, Paris, France (MNHN), it could be easily recognized by its characteristic large head and bicolored elytra (Pic 1923). It is recorded in Laos for the first time.

Microichthyurus falcatus Y. Yang, Liu & X. Yang, sp. nov.

https://zoobank.org/B70E49BE-3CC3-4ADF-B84E-F85F031A2C14

Figs 1C, D, 2C, D, 3B, 4E–H, 5C, D

Etymology. The specific name is derived from the Latin *falcatus* (sickle-shaped, hooked, curved), referring to its median lobe of aedeagus with a horn-shaped protrusion.

Type material. ***Holotype.*** China – Yunnan Prov. • ♂; Mangshi; 900 m; 19-V-1955; Popov leg.; IZAS.

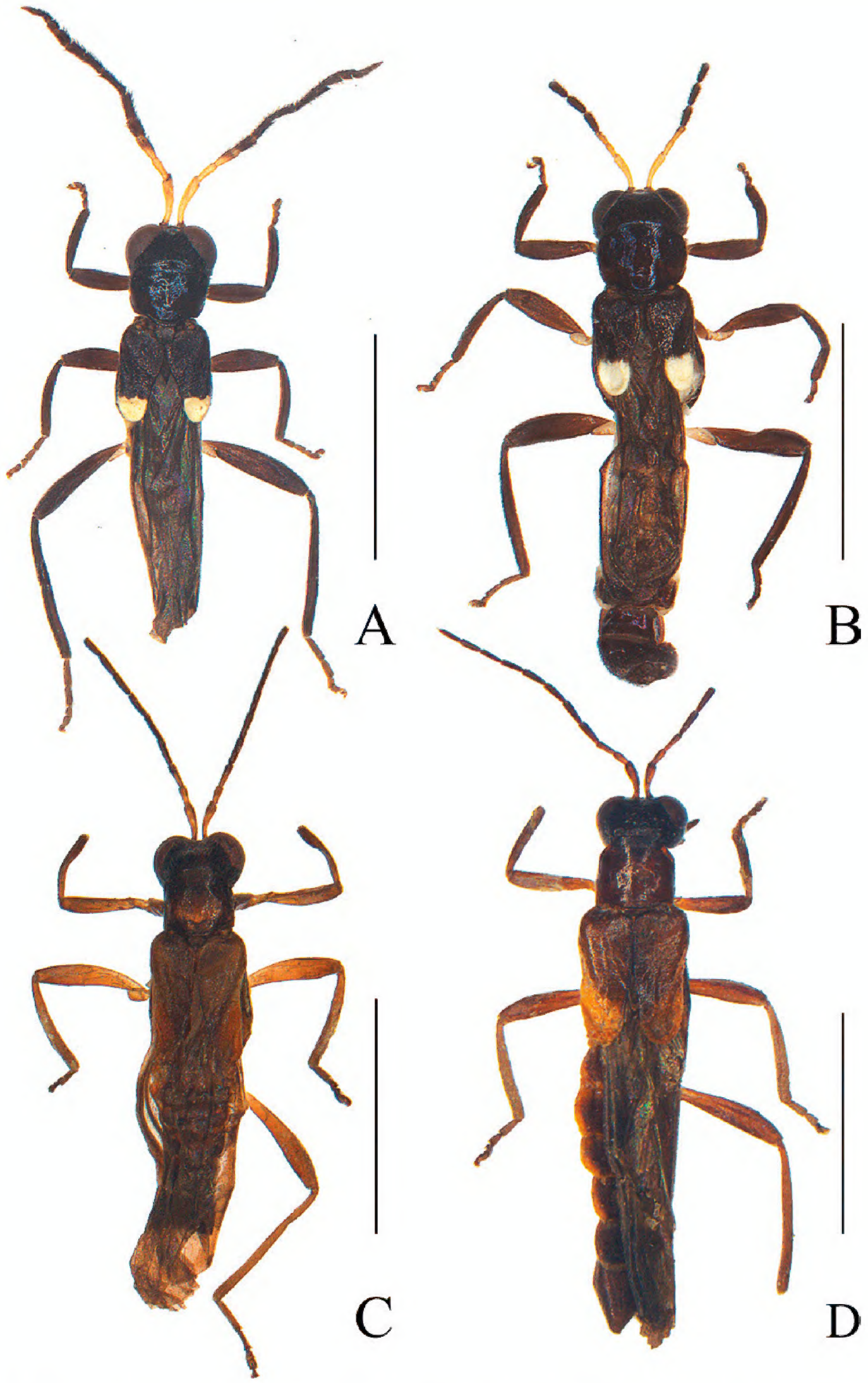

Figure 1. Habitus of *Microichthyurus*, dorsal views. **A–B**. *M. robusticeps* Pic, 1923; **C–D**. *M. falcatus* sp. nov. **A, C**. holotype males; **B, D**. paratype females. Scale bars: 2.0 mm.

Paratypes. China – Yunnan Prov. • 2 ♀♀; same data as holotype; IZAS • 1 ♂ 1 ♀; Longling; 1600 m; 19-V-1955; Busik & L. Wu. leg.; IZAS • 1 ♀; Longling; 1600 m; 19-V-1955; Popov leg.; IZAS • 1 ♂; Longling; 1200 m; 19-V-1955; Krebolanovsky leg.; IZAS • 1 ♀; Jingdong; 900 m; 31-V-1956; Popov leg.; IZAS.

Diagnosis. The species resembles *M. flavicollis* Y. Yang, Liu & X. Yang, 2024, in the general shape of male abdominal sternite VIII and aedeagus, but can be easily distinguished from the latter by the following characters: pronotum dark brown (Fig. 1C–D); abdominal sternite VIII of male (Fig. 2D) with lateral portions acute at latero-apical angles; median lobe of aedeagus (Lin et al. 2024a: fig. 2a, b) present with a horn-shaped protrusion (Fig. 4E, H). Unlike in *M. flavicollis*, pronotum is uniformly yellow; abdominal sternite VIII of male (Lin et al. 2024a: fig. 3a) is rounded at latero-apical angles; median lobe of aedeagus (Lin et al. 2024a: fig. 6a) is present with a fork-shaped protrusion.

Figure 2. A–B. *M. robusticeps* Pic, 1923; **C–D**. *M. falcatus* sp. nov. **A, C**. male abdominal tergite VIII, ventral view; **B, D**. male abdominal sternite VIII, ventral view. Scale bars: 0.2 mm.

Figure 3. Proctiger and paraproct of *Microichthyurus* species, ventral views. **A**. *M. robusticeps* Pic, 1923; **B**. *M. falcatus* sp. nov. Abbreviations: **p** – proctiger; **pp** – paraproct; **tf** – tergal flange. Scale bars: 0.2 mm.

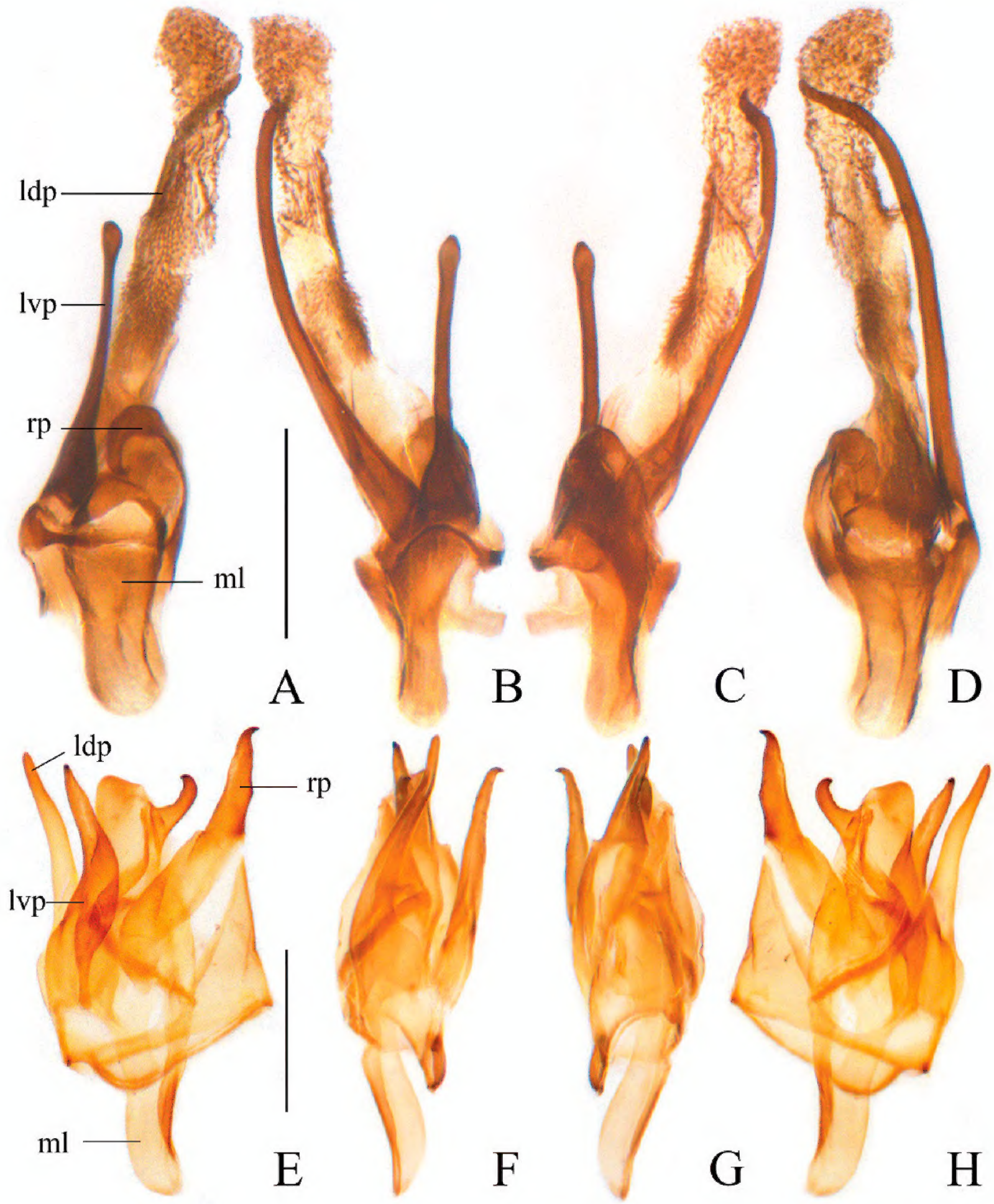

Figure 4. Aedeagi of *Microichthyurus* species. **A–D**. *M. robusticeps* Pic, 1923; **E–H**. *M. falcatus* sp. nov. **A, E**. ventral views; **B, F**. right-lateral views; **C, G**. left-lateral views; **D, H**. dorsal views. Abbreviations: **ldp** – left dorsal paramere; **lvp** – left ventral paramere; **rp** – right paramere; **ml** – median lobe. Scale bars: 0.2 mm.

Description. Body length (both sexes): 4.9–6.8 mm (6.8 mm in holotype); body width (both sexes): 1.0–1.6 mm (1.6 mm in holotype).

Male (Fig. 1C). Coloration. Body black, but yellow at antennomeres I–II, coxae, trochanters, and bases of femora and apical parts of elytra, forming a pair of triangular yellow areas, as well as lateral margins of abdominal ventrites II–VI.

Eyes large, interocular distance about half as wide as diameter of an eye. Antennae extending to posterior margin of abdominal tergite II, antennomeres II about 1/3 length of I, III–XI subequal in length and about twice longer than II.

Pronotum 1.1 times wider than long, anterior margin arcuate, posterior margin slightly bisinuate, lateral margins subparallel, anterior angles rounded, and posterior angles nearly rectangular. Elytra 1.3 times longer than wide, 1.8 times longer than pronotum, with lateral margins sinuate, sutures slightly dehiscent from posterior 2/3 part, distance between sutures slightly wider than width of the elytron, apices rounded.

Abdominal tergite VIII (Fig. 2C) as long as wide, with lateral margins moderately arcuate, postero-lateral projections about 1/4 length of the tergite and straight at inner margins. Abdominal sternite VIII (Fig. 2D) trilobed, with lateral portions nearly inverted triangular, as long as wide,

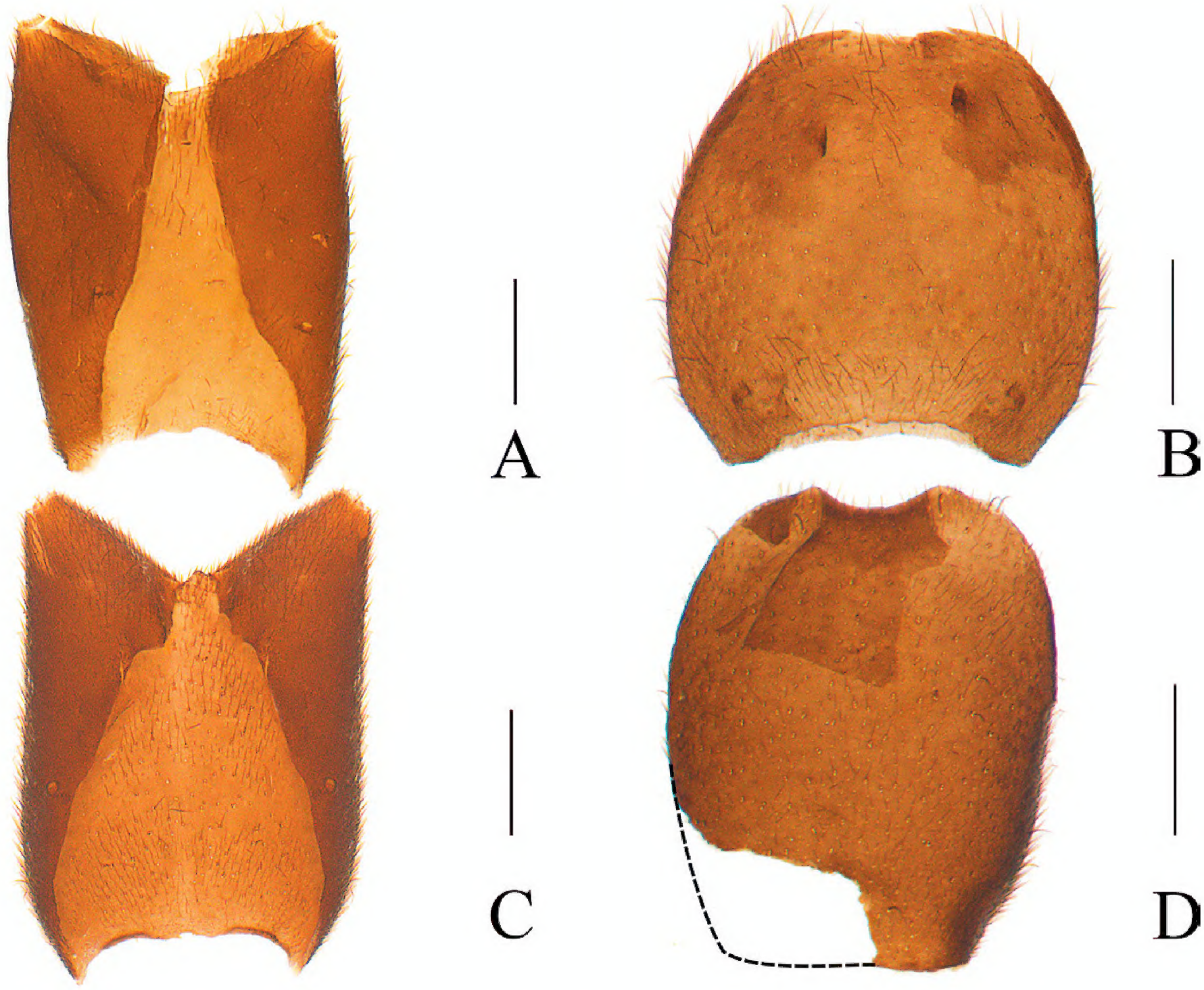

Figure 5. A–B. *Microichthyurus robusticeps* Pic, 1923; **C–D**. *M. falcatus* sp. nov. **A, C**. female abdominal tergite VIII, ventral view; **B, D**. female abdominal sternite VIII, ventral view. Scale bars: 0.2 mm.

inner and outer apical angles sharply projecting, each with an obtuse tooth at posterior margin; middle portion about 1.5 times as long as wide, feebly narrowed posteriorly, nearly straight at posterior margin, and acute and feebly projecting at latero-apical angles. Proctiger (Fig. 3B) semicircular, slightly exceeding over paraproct, covered with short pubescence on surface. Paraproct (Fig. 3B) twice wider than proctiger and feebly narrowed posteriorly, covered with slightly long pubescence along posterior margin, with tergal flange long and almost 4.0 times as long as paraproct, basal 2/5 part strongly broadened and subquadrate, which heart-shapely convex near outer apical angles, apical 3/5 part slender and bent inwards.

Aedeagus (Fig. 4E–H): left ventral paramere rod-like, progressively thinned apically and feebly hooked at apex, moderately sinuate (Fig. 4F, H); left dorsal paramere about 1.1 times longer than left ventral paramere, rod-like, progressively thinned apically and rounded at apex, feebly sinuate (Fig. 4F, H); right paramere nearly as long as left ventral paramere (Fig. 4F, G), abruptly thinned near apex and sharply hooked at apex (Fig. 4E, H); median lobe strongly sclerotized, about 1.2 times longer than parameres, grooved at basal part, long cone-shaped at apical half, rounded at apex, present with a strongly sclerotized and horn-shaped protrusion on ventro-lateral part (Fig. 4E, H).

Female (Fig. 1D). Similar to males, but body larger. Abdominal tergite VIII (Fig. 5C) about 1.2 times longer than wide, with lateral margins arcuate at base, lateral projections about 1/4 length of the tergite, and slightly sinuate at inner margins. Abdominal sternite VIII (Fig. 5D) about 1.2 times longer than wide, with lateral margins moderately converging posteriorly, posterior margin concave in middle, and latero-apical angles rounded.

Distribution. China (Yunnan).

Microichthyurus quadratus Y. Yang, Liu & X. Yang, sp. nov.

https://zoobank.org/93C7217B-B6F7-405A-892B-E612AFABFBA9

Figs 6A, 7A, 8A, 9A, 10A–D

Etymology. The specific name is derived from the Latin *quadratus* (square, squared), referring to its square pronotum.

Type material. ***Holotype.*** China – Yunnan Prov. • ♂; Puer, Lancang, Qianliuyizu, Laopangzhai; 22.77005°N, 100.22653°E; 1825 m; 23-VI-2017; Z. Zhou & X.L. Luo leg.; MHBU.

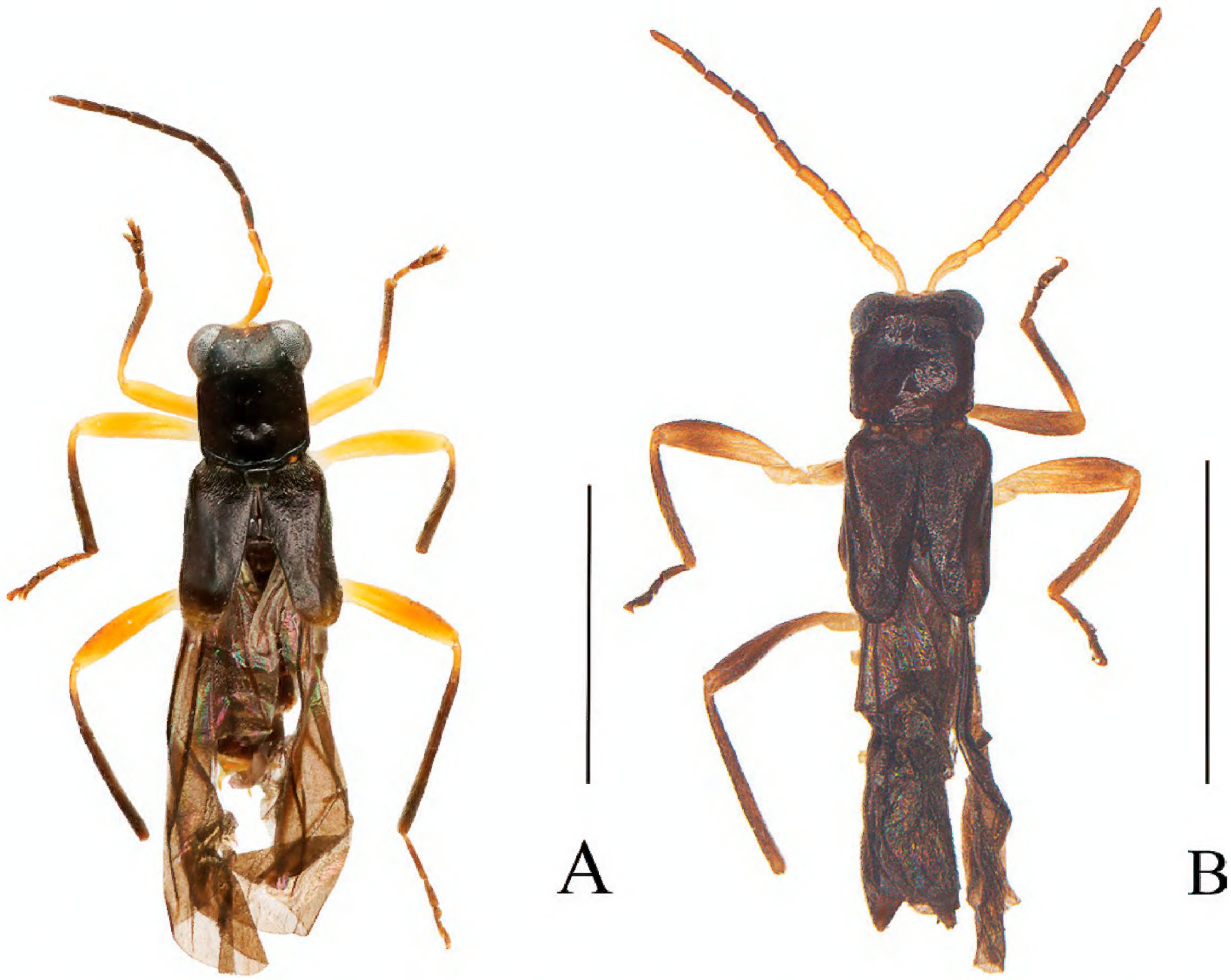

Figure 6. Habitus of *Microichthyurus*, dorsal views. **A**. *M. quadratus* sp. nov.; **B**. *M. crassicornis* sp. nov. **A–B**. holotype males. Scale bars: 2.0 mm.

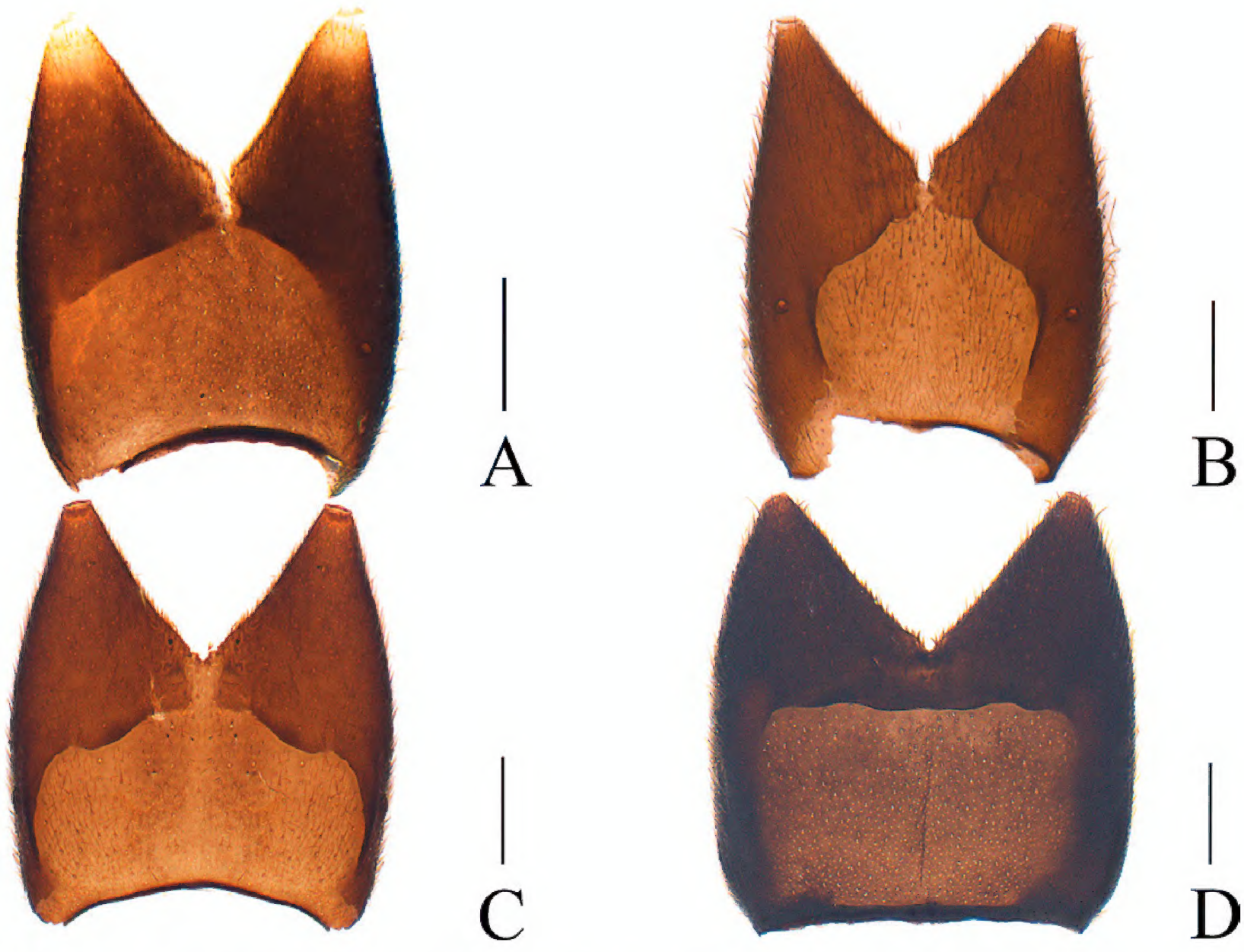

Figure 7. Male abdominal tergite VIII of *Microichthyurus* species, ventral views. **A**. *M. quadratus* sp. nov.; **B**. *M. crassicornis* sp. nov.; **C**. *M. niger* sp. nov.; **D**. *M. tertius* sp. nov. Scale bars: 0.2 mm.

Figure 8. Male abdominal sternite VIII of *Microichthyurus* species, ventral views. **A**. *M. quadratus* sp. nov.; **B**. *M. crassicornis* sp. nov.; **C**. *M. niger* sp. nov.; **D**. *M. tertius* sp. nov. Scale bars: 0.2 mm.

Diagnosis. The species resembles *M. flavifemur* Y. Yang, Lin & Liu, 2024, in the general shape of abdominal sternite VIII of male, but can be easily distinguished from the latter by the following characters: abdominal sternite VIII of male (Fig. 8A) with lateral portions diverging posteriorly from each other, very slender and about 3.0 times as long as basal width, hooked at apices; aedeagus with left dorsal paramere (Fig. 10B, C) extremely short, without long setae at apical margin. Unlike in *M. flavifemur*, abdominal sternite VIII of male (Lin et al. 2024b: fig. 3B) with lateral portions are parallel to each other, axe-shaped, and about 1.5 times longer than basal width, terminally abruptly constricted into a small hook at apex; aedeagus with left dorsal paramere (Lin et al. 2024b: fig. 4A, C, D) long and covered with a tuft of long setae at apex.

Description. Body length: 4.0 mm; body width: 0.9 mm.

Male (Fig. 6A). Coloration. Body black, but yellow at antennomeres I–III, coxae, trochanters, femora, and apical 1/5 parts of tibiae yellow, as well as apices of elytra.

Eyes moderately large, interocular distance about 0.8 times as wide as diameter of an eye. Antennae extending to posterior margin of abdominal tergite IV, antennomeres II about 1/3 length of I, III–XI subequal in length and about 1.2 times longer than II.

Pronotum as long as wide, anterior and posterior margins nearly straight, lateral margins straight and parallel, anterior angles nearly rectangular, and posterior angles rounded. Elytra 1.3 times longer than wide, 1.7 times longer than pronotum, with lateral margins subparallel, sutures slightly dehiscent from the base, distance between sutures slightly wider than the elytron, apices rounded.

Abdominal tergite VIII (Fig. 7A) about 1.2 times longer than wide, with lateral margins slightly arcuate, postero-lateral projections about 2/5 length of the tergite, and sinuate at inner margins. Abdominal sternite VIII (Fig. 8A) trilobed, with lateral portions diverging posteriorly from each other, very slender and about 3.0 times as long as basal width, inner apical angles rectangular and outer apical angles feebly hooked outwards; middle portion 1.5 times longer than wide, slightly narrowed posteriorly and rounded at latero-apical angles. Proctiger (Fig. 9A) semicircular, triangularly emarginate in middle of posterior margin, and covered with a few long setae on surface. Paraproct (destroyed with tergal flange missing).

Aedeagus (Fig. 10A–D): left ventral paramere rod-like, moderately sinuate, feebly hooked at apex (Fig. 10B, C); left dorsal paramere extremely short and about 1/3 length of left ventral paramere, lamellar and slightly sclerotized, rounded at apical margin (Fig. 10B, C); right paramere rod-like, about 1.1 times longer than left ventral paramere, moderately sinuate and thinnest in middle part (Fig. 10B, C), feebly double-hooked at apex (Fig. 10C); median lobe (Fig. 10D) short and about half length of parameres, slightly sclerotized, grooved at basal part, stout tube-shaped at apical half, rounded at apex.

Female. Unknown.

Distribution. China (Yunnan).

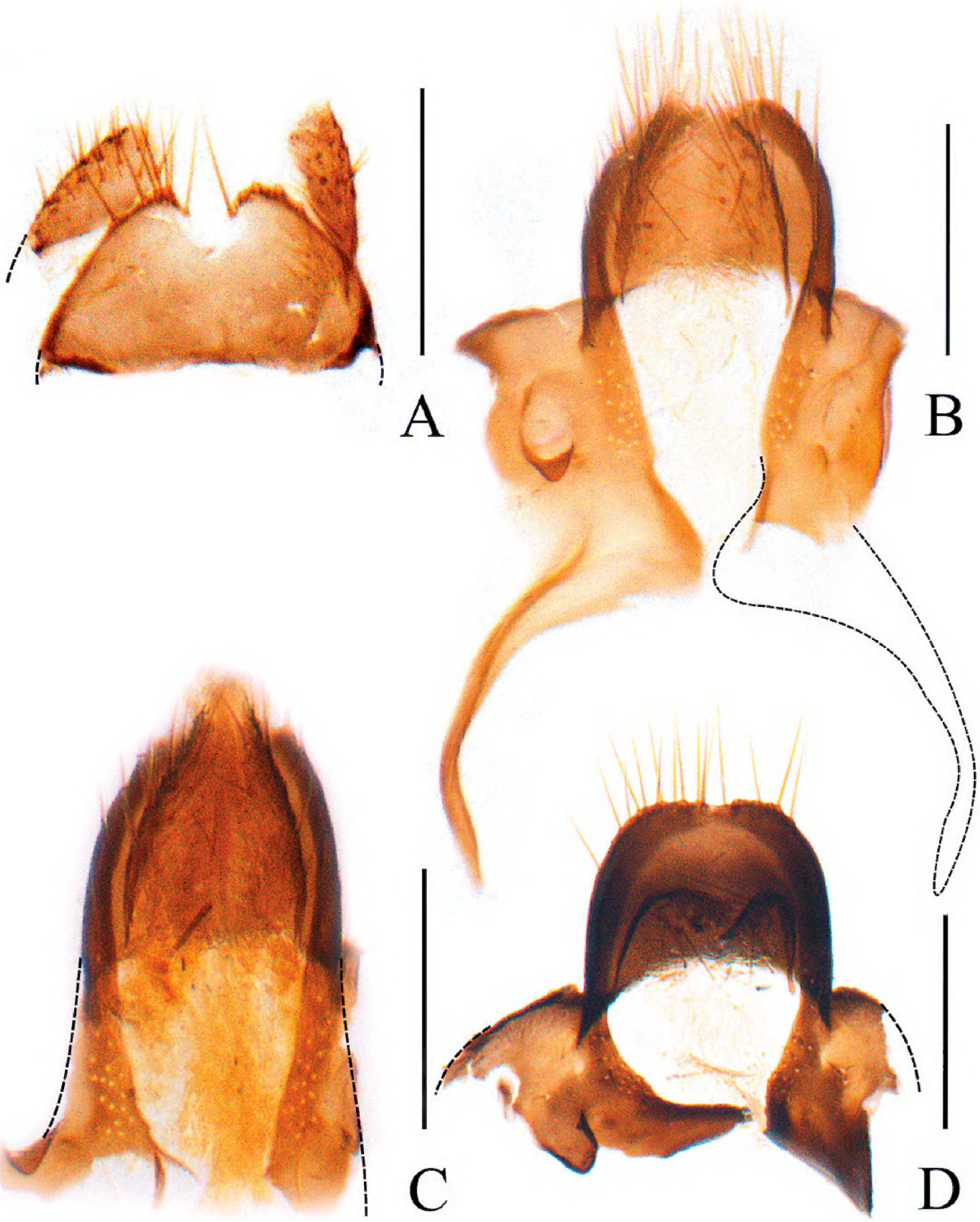

Figure 9. Proctiger and paraproct of *Microichthyurus* species, ventral views. **A**. *M. quadratus* sp. nov.; **B**. *M. crassicornis* sp. nov.; **C**. *M. niger* sp. nov.; **D**. *M. tertius* sp. nov. Scale bars: 0.2 mm.

***Microichthyurus crassicornis* Y. Yang, Liu & X. Yang, sp. nov.**

https://zoobank.org/A90C61FF-BD41-4B37-8513-C67D8CA366B0

Figs 6B, 7B, 8B, 9B, 10E–H

Etymology. The specific name is derived from the Latin *crassus* (thick) and *cornus* (horn), referring to its antennae broaden.

Type material. ***Holotype.*** China – Yunnan Prov. • ♂; Xishuangbanna, Tropical Botanical Garden; 659–819 m; 31-V-2015; Z.Z. Huang leg.; IZAS.

Paratypes. China – Yunnan Prov. • 1 ♂; Lancang, Huimin, Jingmai; 22.59278°N, 100.02623°E; 1488 m; 11-VII-2017; netting; J.F. Liang & C.C. Yu leg.; MHBU • 1 ♂; Lancang, Jiujinghanizu, Shuifang; 22.59278°N, 100.05669°E; 1546 m; 6-VII-2017; netting; X.M. Wang leg.; MHBU.

Diagnosis. The species resembles *M. quadratus* sp. nov. in the shape of abdominal sternite VIII but can be easily distinguished from the latter by the following characters: abdominal sternite VIII of male (Fig. 8B) with lateral portions converging posteriorly to each other, middle portion subparallel-sided and as long as wide; aedeagus with median lobe (Fig. 10E, H) strongly sclerotized, pocket-shaped at apical part, strongly protruding at latero-apical portions. Unlike in *M. quadratus* sp. nov., abdominal sternite VIII of male (Fig. 8A) with lateral portions diverging posteriorly from each other, middle portion slightly narrowed

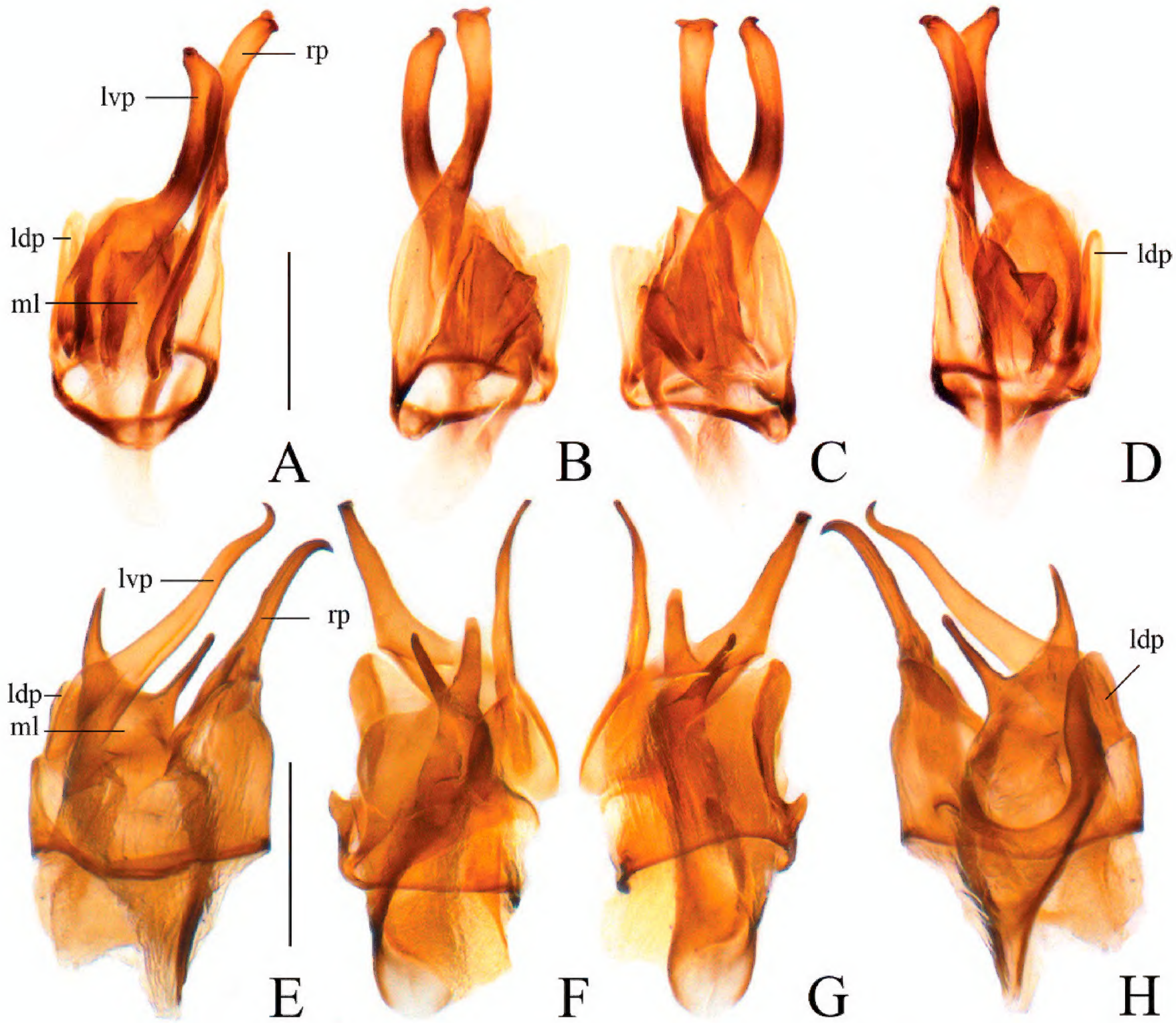

Figure 10. Aedeagi of *Microichthyurus* species. **A–D**. *M. quadratus* sp. nov.; **E–H**. *M. crassicornis* sp. nov. **A, E**. ventral views; **B, F**. right-lateral views; **C, G**. left-lateral views; **D, H**. dorsal views. Abbreviations: **ldp** – left dorsal paramere; **lvp** – left ventral paramere; **rp** – right paramere; **ml** – median lobe. Scale bars: 0.2 mm.

posteriorly and 1.5 times as long as wide; aedeagus with median lobe (Fig. 10D) slightly sclerotized, stout tube-shaped at apical half, rounded at apex.

Description. Body length: 4.0–4.1 mm (4.0 mm in holotype); body width: 0.9 mm (0.9 mm in holotype).

Male (Fig. 6B). Coloration. Body black, but yellow at antennomeres I–VI, clypeus, pro- and meta-coxae and trochanters, meso-coxae, trochanters, and basal half parts of femora.

Eyes large, interocular distance about 0.6 times as wide as diameter of an eye. Antennae cylindrically thickened and extending posterior margin of abdominal tergite II; antennomeres II–III subequal and about 1/3 length of I, IV–XI subequal in length and about twice longer than III.

Pronotum 1.1 times wider than long, anterior margin slightly arcuate and posterior margin nearly straight, lateral margins parallel, anterior angles rounded, and posterior angles rectangular. Elytra 1.3 times longer than wide, 1.8 times longer than pronotum, with lateral margins subparallel, sutures dehiscent from the base, distance between sutures nearly as wide as width of the elytron, apices rounded.

Abdominal tergite VIII (Fig. 7B) about 1.2 times longer than wide, with lateral margins slightly arcuate, postero-lateral projections about 2/5 length of the tergite and nearly straight at inner margins. Abdominal sternite VIII (Fig. 8B) trilobed, with lateral portions converging posteriorly to each other, very slender and about 4.0 times as long as basal width, hardly hooked at apex; middle portion nearly parallel-sided, as long as wide, slightly arcuate at posterior margin and rounded at latero-apical angles. Proctiger (Fig. 9B) semioval, almost surrounded by paraproct and densely covered with long pubescence on surface. Paraproct (Fig. 9B) semicircular and obviously bordered at lateral margins, slightly emarginate in middle of posterior margin, around which covered with long pubescence, with tergal flange long and about 3.0 times as long as paraproct, basal half part strongly broadened and 1.2 times longer than wide, acute at apical outer angles, bisinuate at outer margin and nearly straight at inner margin, present with an oblong bubble-shaped convex on surface, apical half part slender and bent inwards.

Aedeagus (Fig. 10E–H): left ventral paramere slender and feebly bisinuate in dorsal and ventral views (Fig. 10E, H),

sharply hooked at apex (Fig. 10E); left dorsal paramere extremely short and lamellar, about 2/5 length of left ventral paramere, rounded at apical margin (Fig. 10E); right paramere nearly as long as left ventral paramere, slender and nearly straight in dorsal and ventral views, sharply hooked at apex (Fig. 10E, H); median lobe as long as parameres, strongly sclerotized, grooved at basal part, pocket-shaped at apical part, distinctly protruding at latero-apical portions, both protrusions very slender and nearly straight, subequal in length and acute at apices (Fig. 10E, H).

Female. Unknown.

Distribution. China (Yunnan).

Microichthyurus niger Y. Yang, Liu & X. Yang, sp. nov.

https://zoobank.org/37F026DA-0B91-4ACE-B866-39DBCC359BEE

Figs 7C, 8C, 9C, 11A–B, 12A–D, 13A, B

Etymology. The specific name is derived from the Latin *niger* (black), referring to its black body.

Type material. ***Holotype.*** China – Yunnan Prov. • ♂; Jinghong, Menghai, Nabanhe Nature Reserve; 22.24644°N, 100.60610°E; 1114 m; 26-V-2009; L.Z. Meng leg.; IZAS.

Paratypes. China – Yunnan Prov. • 2 ♀♀; same data as holotype; IZAS • 2 ♀♀; Jinghong, Menghai, Nabanhe Nature Reserve; 22.24644°N, 100.60610°E; 1114 m; 26-IV-2009; L.Z. Meng leg.; IZAS • 2 ♂♂ 3 ♀♀; Jinghong, Menghai, Nabanhe Nature Reserve; 22.24644°N, 100.60610°E; 1114 m; 6-V-2009; L.Z. Meng leg.; IZAS • 2 ♂♂; Jinghong, Menghai, Nabanhe Nature Reserve, Anmaxinzhai; 22.19577°N, 100.64532°E; 772 m; 16-V-2009; L.Z. Meng leg.; IZAS.

Diagnosis. The species resembles *M. crassicornis* sp. nov. in the general shape of abdominal sternite VIII and aedeagus but can be easily distinguished from the latter by the following characters: abdominal tergite VIII of male as long as wide (Fig. 7C); abdominal sternite VIII of male (Fig. 8C) with lateral portions less slender and about 3.0 times as long as basal width; aedeagus with median lobe moderately sclerotized, one protrusion slender and bent, distinctly longer than the other (Fig. 12A, D). Unlike in *M. crassicornis* sp. nov., abdominal tergite VIII of male 1.2 times longer than wide (Fig. 7B); abdominal sternite VIII of male (Fig. 8B) with lateral portions is slenderer and about 4.0 times as long as basal width; aedeagus with median lobe strongly sclerotized, both protrusions subequal in length and nearly straight (Fig. 10E, H).

Description. Body length (both sexes): 5.5–7.0 mm (5.7 mm in holotype); body width (both sexes): 1.0–1.1 mm (1.1 mm in holotype).

Male (Fig. 11A). Coloration. Body black, only antennae and clypeus brown.

Eyes large, interocular distance about half as wide as diameter of an eye. Antennae cylindrically thickened and extending to posterior margin of abdominal tergite II; antennomeres II about 1/3 length of I, III–XI subequal in length and about twice longer than II.

Pronotum 1.1 times wider than length, anterior margin strongly arcuate, posterior margin slightly arcuate, lateral margins parallel, anterior angles nearly rectangular, and posterior angles rounded. Elytra 1.4 times longer than wide, 1.6 times longer than pronotum, with lateral margins subparallel, sutures slightly dehiscent from the base, distance between sutures nearly as wide as width of the elytron, apices rounded.

Abdominal tergite VIII (Fig. 7C) as long as wide, with lateral margins slightly arcuate, postero-lateral projections about 2/5 length of the tergite and straight at inner margins. Abdominal sternite VIII (Fig. 8C) trilobed, with lateral portions converging posteriorly to each other, slender and about 3.0 times as long as basal width, feebly hooked inwards at apex; middle portion feebly longer than wide, feebly widened posteriorly, nearly straight at posterior margin, and rounded at latero-apical angles. Proctiger (Fig. 9C) peach-like, almost surrounded by paraproct and covered with slightly long pubescence on surface. Paraproct (Fig. 9C) semicircular and obviously bordered at lateral margins, slightly emarginate in middle of posterior margin, around which covered with slightly long pubescence (with tergal flange destroyed).

Aedeagus (Fig. 12A–D): left ventral paramere slender and nearly straight in dorsal and ventral views (Fig. 12A, D), obtusely hooked at apex; left dorsal paramere extremely short and lamellar, about half length of left ventral paramere, rounded at apical margin (Fig. 12A); right paramere about 4/5 length of left ventral paramere, slender and nearly straight in dorsal and ventral views, sharply hooked at apex (Fig. 12B, C); median lobe as long as parameres, moderately sclerotized, grooved at basal part, stout tube-shaped at apical part, distinctly protruding on one latero-apical portion, slightly protruding on the opposite portion, one protrusion slender and bent, distinctly longer than the other, both sharp at apices (Fig. 12A, D).

Female (Fig. 11B). Similar to males, but body larger, antennae simple and filiform. Abdominal tergite VIII (Fig. 13A) as long as wide, with lateral margins arcuate at base, lateral projections sharper, about 1/4 length of the tergite, and slightly sinuate at inner margins. Abdominal sternite VIII (Fig. 13B) about 1.1 times longer than wide, with lateral margins slightly converging posteriorly, posterior margin straight in middle, and latero-apical angles nearly rectangular.

Distribution. China (Yunnan).

Microichthyurus tertius Y. Yang, Liu & X. Yang, sp. nov.

https://zoobank.org/AAEEFB9C-0B34-4BDF-883D-0AA41BFE7D55

Figs 7D, 8D, 9D, 11C, D, 12E–H, 13C, D

Etymology. The specific name is derived from the Latin *tertius* (third), referring to its distinctive antennomere III.

Type material. ***Holotype.*** China – Yunnan Prov. • ♂; Dali, Jizushan; 25.9574°N, 100.3899°E; 25-VII-2023; C. Fang & J.B. Tong leg.; MHBU.

Paratypes. China – Yunnan Prov. • 6 ♂♂ 2 ♀♀; same data as holotype; MHBU.

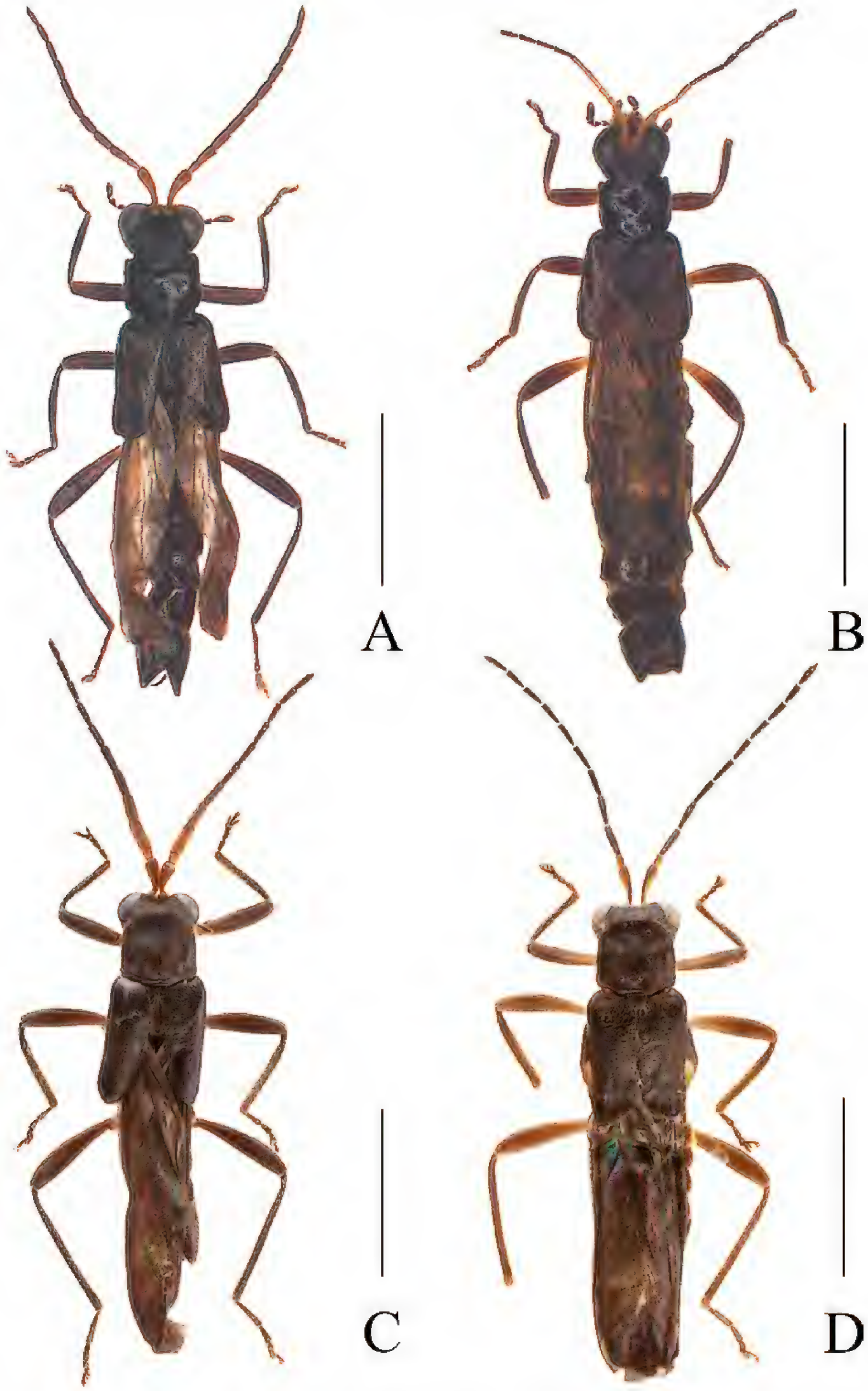

Figure 11. Habitus of *Microichthyurus*, dorsal views. **A–B**. *M. niger* sp. nov.; **C–D**. *M. tertius* sp. nov. **A, C**. holotype males; **B, D**. paratype females. Scale bars: 2.0 mm.

Diagnosis. The species resembles *M. niger* sp. nov. in the general shape of abdominal sternite VIII of male and aedeagus but can be easily distinguished from the latter by the following characters: basal antennomeres distinctly cylindrically thickened in male (Fig. 11C); abdominal sternite VIII of male (Fig. 8D) with lateral portions well delimited and keeled along inner margins, middle portion slightly narrowed posteriorly; aedeagus with right paramere beak-shaped at apex, median lobe with one protrusion (Fig. 12E, H). Unlike in *M. niger* sp. nov., basal antennomeres moderately cylindrically thickened in male (Fig. 11A); abdominal sternite VIII of male (Fig. 8C) with lateral margins never ridged along inner margins, middle portion slightly widened posteriorly; aedeagus with right paramere acute at apex (Fig. 12A, D), median lobe with two protrusions.

Description. Body length (both sexes): 5.0–6.5 mm (5.2 mm in holotype); body width (both sexes): 1.0–1.1 mm (1.1 mm in holotype).

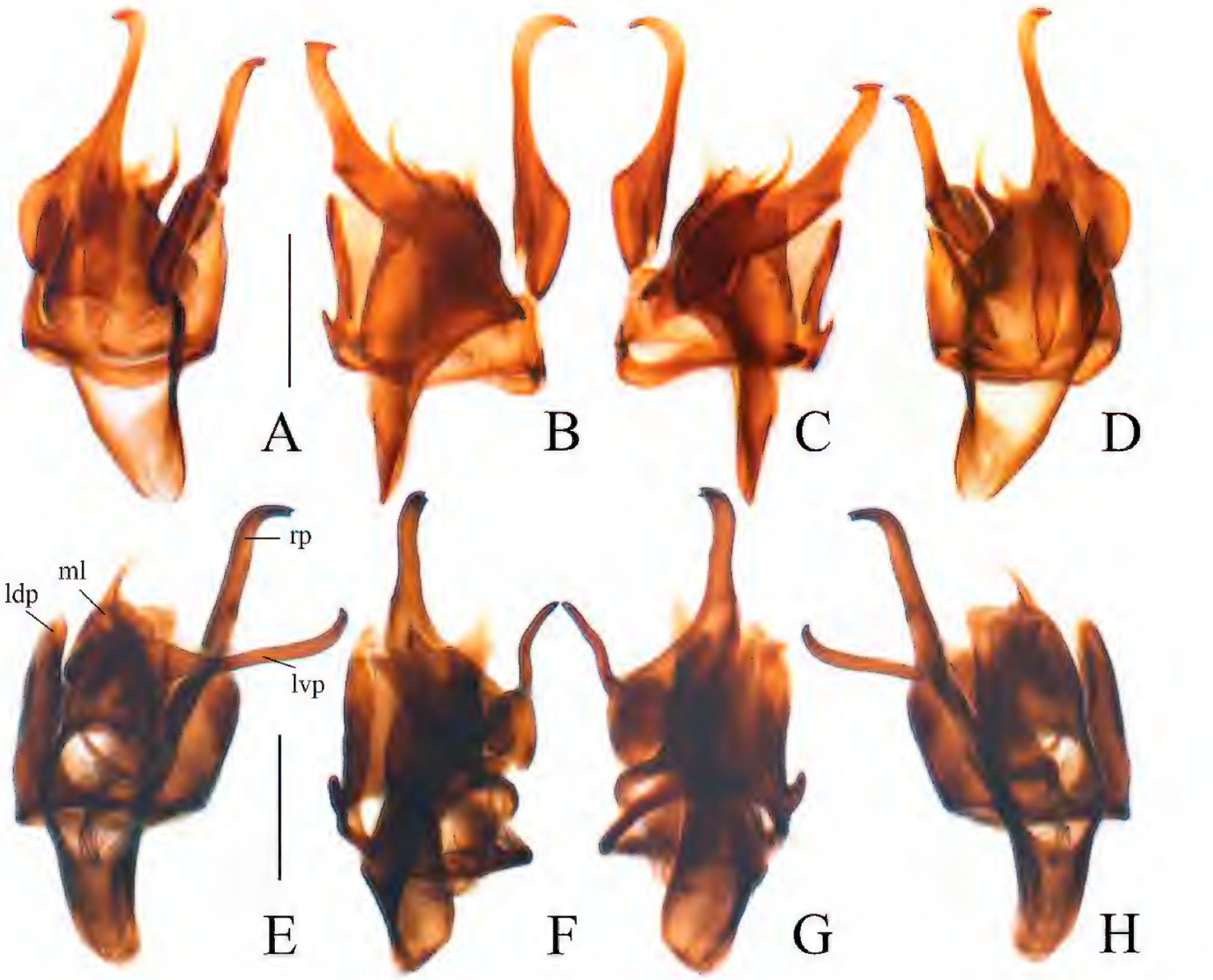

Figure 12. Aedeagi of *Microichthyurus* species. **A–D**. *M. niger* sp. nov.; **E–H**. *M. tertius* sp. nov. **A, E**. ventral views; **B, F**. right-lateral views; **C, G**. left-lateral views; **D, H**. dorsal views. Abbreviations: **ldp** – left dorsal paramere; **lvp** – left ventral paramere; **rp** – right paramere; **ml** – median lobe. Scale bars: 0.2 mm.

Male (Fig. 11C). Coloration. Body black, brown at antennomeres I–IV, coxae, trochanters, and basal 1/3 parts of femora, as well as margins of abdominal segments II–VI.

Eyes large, interocular distance about half as wide as diameter of an eye. Antennae extending to posterior margin of abdominal tergite III, antennomeres I–IV cylindrically thickened, III longest, I slightly shorter than III, II shortest and about 1/3 length of III, IV–VII subequal in length and about 2/3 length of III, VIII–XI subequal in length and slightly shorter than VII.

Pronotum 1.1 times wider than length, anterior margin and posterior margin slightly arcuate, lateral margins parallel, anterior angles and posterior angles rounded. Elytra 1.4 times longer than wide, 1.8 times longer than pronotum, with lateral margins subparallel, sutures slightly dehiscent from the base, distance between sutures wider than the width of the elytron, apices rounded.

Abdominal tergite VIII (Fig. 7D) as long as wide, with lateral margins slightly arcuate, postero-lateral projections about half length of the tergite and straight at inner margins. Abdominal sternite VIII (Fig. 8D) trilobed, with lateral portions converging posteriorly to each other, slender and about 4.0 times as long as basal width, acute at apex, well delimited and keeled along inner margins, inner apical angles feebly projecting and rounded; middle portion 1.2 times longer than wide, slightly narrowed posteriorly, tapered at posterior margin, and rounded at latero-apical angles. Proctiger (Fig. 9D) weakly sclerotized and about half length of paraproct. Paraproct (Fig. 9D) semicircular and obviously bordered around all margins, posterior covered with a few long pubescence around posterior margin (with tergal flange destroyed).

Aedeagus (Fig. 12E–H): left ventral paramere slender and nearly straight in dorsal and ventral views (Fig. 12E, H), sharply hooked at apex, strongly bent inwards and near parallel; left dorsal paramere extremely short and lamellar, about half length of left ventral paramere, rounded at apical margin (Fig. 12E); right paramere about 4/5 length of left ventral paramere, slender and nearly straight in dorsal and ventral views, largely hooked and

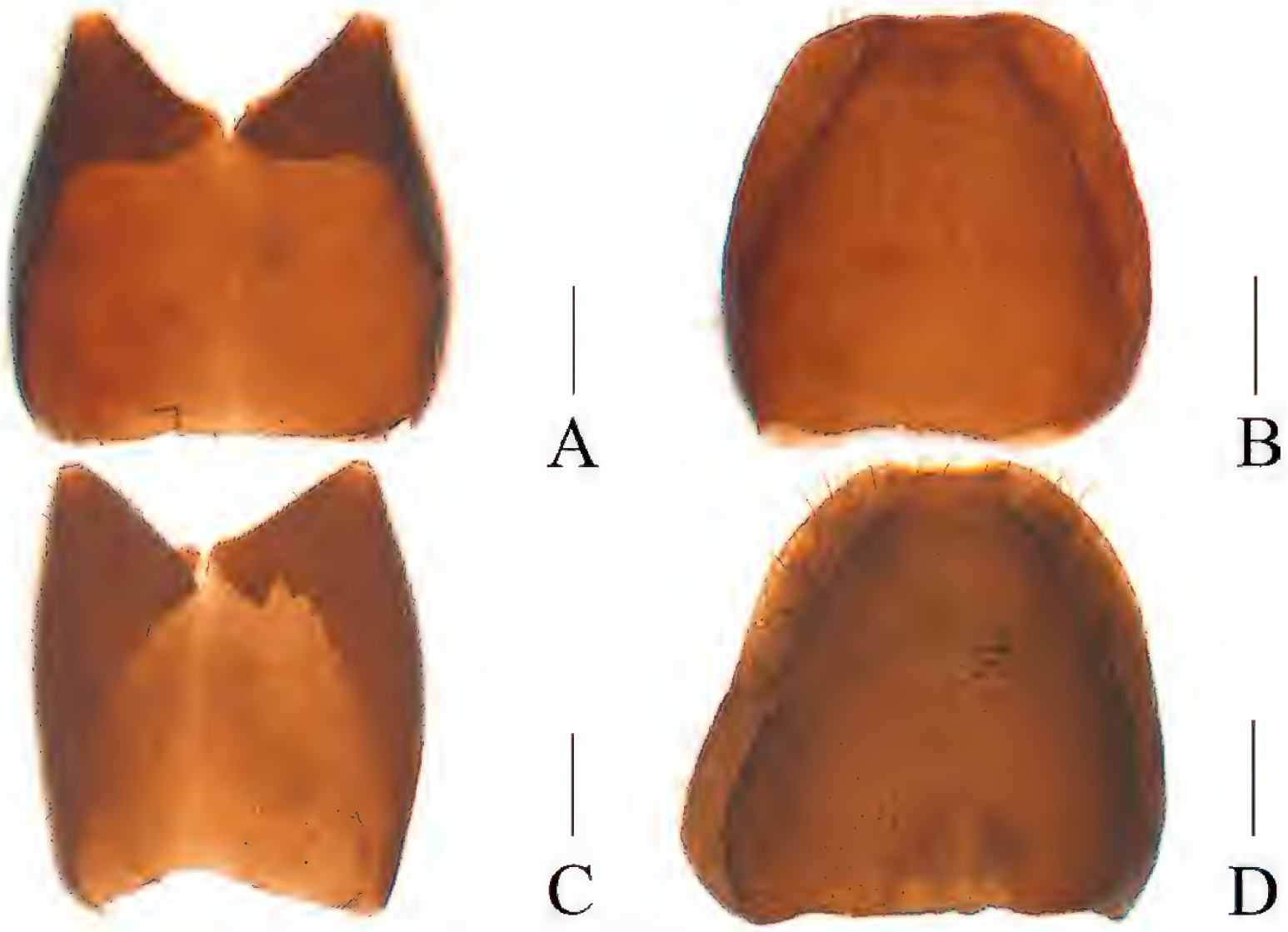

Figure 13. A–B. *Microichthyurus niger* sp. nov.; **C–D**. *M. tertius* sp. nov. **A, C**. female abdominal tergite VIII, ventral view; **B, D**. female abdominal sternite VIII, ventral view. Scale bars: 0.2 mm.

beak-like at apex (Fig. 12E–H); median lobe as long as parameres, moderately sclerotized, grooved at basal part, cone-shaped at apical part, distinctly protruding on latero-apical portion, the projection slender, bent, and acute at apex (Fig. 12E, H).

Female (Fig. 11D). Similar to males, but body larger, antennae simple and filiform, I–II yellow ventrally and black. Abdominal tergite VIII (Fig. 13C) 1.1 times longer than wide, with lateral margins arcuate at base, lateral projections about 1/3 length of the tergite, and slightly sinuate at inner margins. Abdominal sternite VIII (Fig. 13D) about 1.1 times longer than wide, with lateral margins slightly converging posteriorly, posterior margin straight in middle, and latero-apical angles rounded.

Distribution. China (Yunnan).

Microichthyurus guangxiensis Y. Yang, Lin & Liu, sp. nov.

https://zoobank.org/28540117-6000-4E93-A46C-12BA17BAA106

Figs 14A, B, 15A, 16A, 17A, 18A–D, 19A, B

Etymology. The specific name is derived from the name of the type locality, Guangxi, China.

Type material. ***Holotype.*** China – Guangxi Zhuang Autonomous Region • ♂; Longsheng, Huaping, Anjiangping; 1345 m; 31-V-2023; sweeping; H.Q. Lin & S.L. Yuan leg.; MHBU.

Paratypes. China – Guangxi Zhuang Autonomous Region • 5 ♂♂ 5 ♀♀; same data as holotype; MHBU.

Diagnosis. The species resembles *M. hubeiensis* Y. Yang, Lin & Liu, 2024, in the habitus and the general shape of aedeagus but could be easily differentiated from the latter by the following characters: abdominal tergite VIII of male (Fig. 15A) 1.1 times wider than long; abdominal sternite VIII of male (Fig. 16A) with lateral portions phone-shaped, moderately emarginate in middle of inner margins, without any protrusions at apices; aedeagus with median lobe acute at one latero-apical portion and rounded at the opposite portion (Fig. 18A, D). Unlike in *M. hubeiensis*, abdominal tergite VIII of male (Lin et al. 2024a: fig. 4c) is 1.1 times longer than wide; abdominal sternite VIII of male (Lin et al. 2024a: fig. 3c) with lateral portions is slender and bisinuate at inner margins, each present with a small and sharply hooked protrusion at apex; aedeagus with median lobe rounded at latero-apical portions (Lin et al. 2024a: fig. 10a–d).

Description. Body length (both sexes): 4.5–4.8 mm (4.8 mm in holotype); body width (both sexes): 0.9–1.1 mm (0.9 mm in holotype).

Male (Fig. 14A). Coloration. Body black, but yellow at antennomeres I–II and III ventrally, apical 1/3 parts of elytra, pro- and meso-coxae, trochanters, basal half parts of femora, meta-coxae, and trochanters.

Eyes large, interocular distance about 0.4 times as wide as diameter of an eye. Antennae extending to posterior margin of abdomen tergite IV, antennomeres II about 1/3 length of I, III–X subequal and about twice longer than II, XI about 2/3 length of X.

Pronotum nearly as long as wide, anterior margin arcuate, posterior margin bisinuate, lateral margins subparallel,

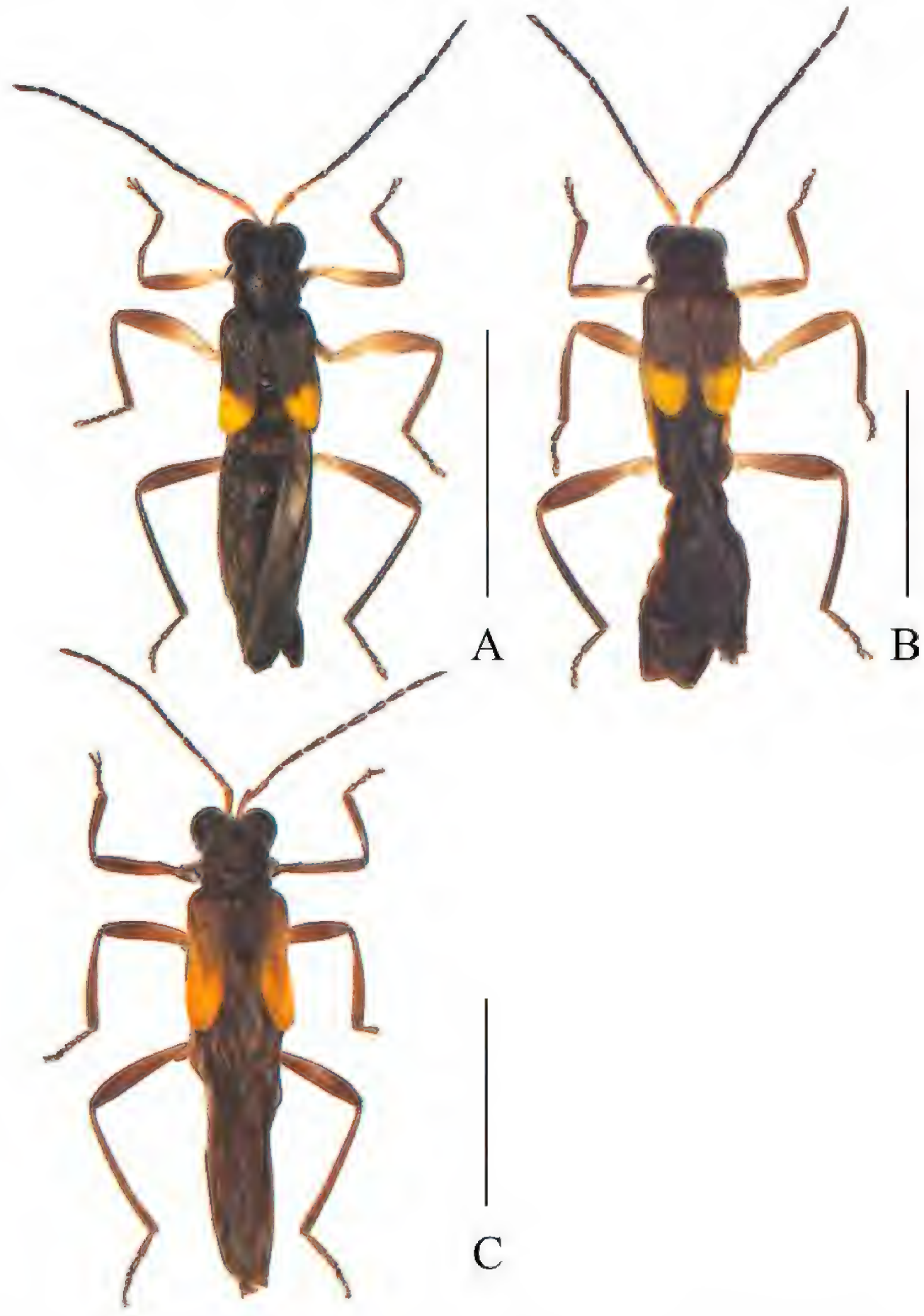

Figure 14. Habitus of *Microichthyurus*, dorsal views. **A–B**. *M. guangxiensis* sp. nov.; **C**. *M. flavipennis* sp. nov. **A, C**. holotype males; **B**. paratype female. Scale bars: 2.0 mm.

anterior angles rounded, and posterior angles nearly rectangular. Elytra 1.3 times longer than wide, 1.9 times longer than pronotum, with lateral margins subparallel, sutures slightly dehiscent from the base, the distance between sutures narrower width of the elytron, apices rounded.

Abdominal tergite VIII (Fig. 15A) 1.1 times wider than long, with lateral margins arcuate, postero-lateral projections about 1/3 length of the tergite, and feebly arcuate at inner margins. Abdominal sternite VIII (Fig. 16A) trilobed, with lateral portions converging posteriorly to each other, phone-like and about 2.5 times as long as basal width, roundly emarginate in middle of inner margins, nearly rectangular at apices; middle portion 1.1 times wider than long, widened posteriorly, nearly straight at posterior margin, and rounded at latero-apical angles. Proctiger (Fig. 17A) semicircular and narrowed posteriorly, completely surrounded by paraproct, obviously bordered along lateral margins. Paraproct (Fig. 17A) semicircular and obviously bordered along lateral margins, slightly emarginate in middle of posterior margin, around which covered with a few slightly long pubescence (with tergal flange destroyed).

Aedeagus (Fig. 18A–D): left ventral paramere strongly twisted, bisinuate in dorsal and ventral views (Fig. 18A, D), bifurcate at apex (Fig. 18A–D); left dorsal paramere half-length of left ventral paramere, lamellar and widely rounded at apex (Fig. 18B, D); right paramere about 4/5 length of left ventral paramere, strongly twisted, compresses laterally and abruptly thinned near apex, acute at apex (Fig. 18A–D); median

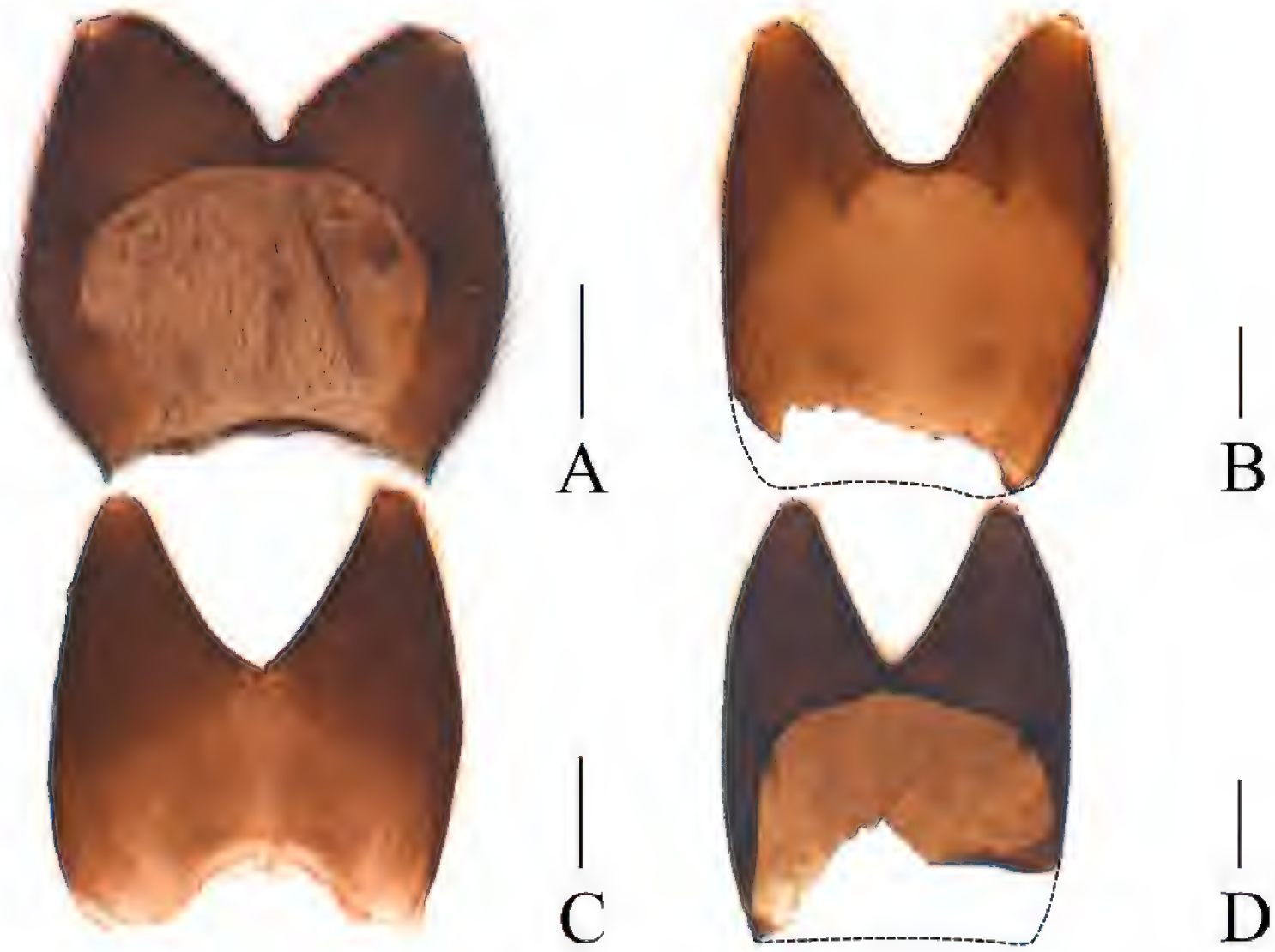

Figure 15. Male abdominal tergite VIII of *Microichthyurus* species, ventral views. **A**. *M. guangxiensis* sp. nov.; **B**. *M. flavipennis* sp. nov.; **C**. *M. bimaculatus* sp. nov.; **D**. *M. strictipennis* sp. nov. Scale bars: 0.2 mm.

Figure 16. Male abdominal sternite VIII of *Microichthyurus* species, ventral views. **A**. *M. guangxiensis* sp. nov.; **B**. *M. flavipennis* sp. nov.; **C**. *M. bimaculatus* sp. nov.; **D**. *M. strictipennis* sp. nov. Scale bars: 0.2 mm.

lobe moderately sclerotized and 1.2 times longer than parameres, grooved at basal part and pocket-shaped at apical part, distinctly protruding on latero-apical portions, the protrusions stout (Fig. 18A, D).

Female (Fig. 14B). Similar to males, but body larger, abdominal tergite VIII (Fig. 19A) about 1.5 longer than wide, lateral projections about 1/6 length of the tergite and slightly arcuate at inner margins; abdominal sternite VIII (Fig. 19B) about 1.2 times longer than wide, with lateral margins slightly converging posteriorly, posterior margin slightly arcuate, and latero-apical angles rounded.

Distribution. China (Guangxi).

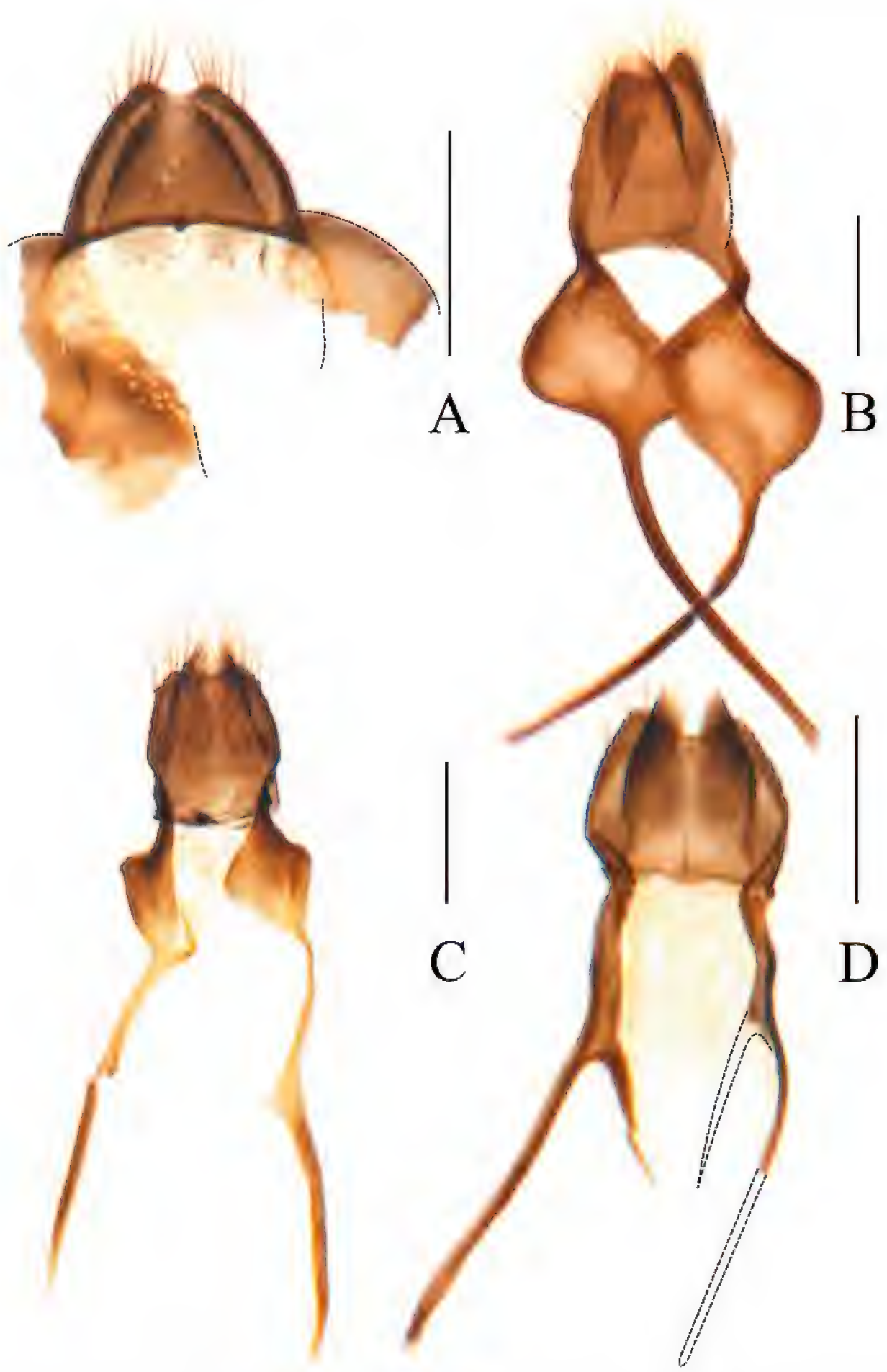

Figure 17. Proctiger and paraproct of *Microichthyurus* species, ventral views. **A**. *M. guangxiensis* sp. nov.; **B**. *M. flavipennis* sp. nov.; **C**. *M. bimaculatus* sp. nov.; **D**. *M. strictipennis* sp. nov. Scale bars: 0.2 mm.

***Microichthyurus flavipennis* Y. Yang, Lin & Liu, sp. nov.**

https://zoobank.org/88D1C1B9-1125-4423-BA46-167EDC79D72D

Figs 14C, 15B, 16B, 17B, 18E–H

Etymology. The specific name is derived from the Latin *flavus* (yellow) and *penna* (feather), referring to its mostly yellow elytra.

Type material. ***Holotype.*** China – Guangxi Zhuang Autonomous Region • ♂, Longsheng; 1800 m; 20-IV-1963; S.Y. Wang leg.; IZAS.

Paratypes. China – Guangxi Zhuang Autonomous Region • 3 ♂♂; same data as holotype; IZAS.

Diagnosis. The species resembles *M. villosipes* Y. Yang, Liu & X. Yang, 2024, in the habitus and the general shape of aedeagus but could be easily differentiated from the latter by the following characters: antennae normally filiform in male (Fig. 14C); mesotibiae never covered with longer hairs in male (Fig. 14C); abdominal sternite VII without any bulges or long setae in male; aedeagus with left dorsal paramere (Fig. 18E) about 0.7 times length of left ventral paramere. Unlike in *M. villosipes*, antennae cylindrically thickened in male (Lin et al. 2024a: fig. 9a); male mesotibiae densely covered with longer and erected hairs in male (Lin et al. 2024a: fig. 8a); abdominal sternite VII with one bulge covered with long setae in male (Lin et al. 2024a: fig. 8b); aedeagus with left dorsal paramere 1.1 times longer than left ventral paramere (Lin et al. 2024a: fig. 6e, f).

Description. Body length: 5.2–5.6 mm (5.6 mm in holotype); body width: 1.0–1.3 mm (1.3 mm in holotype).

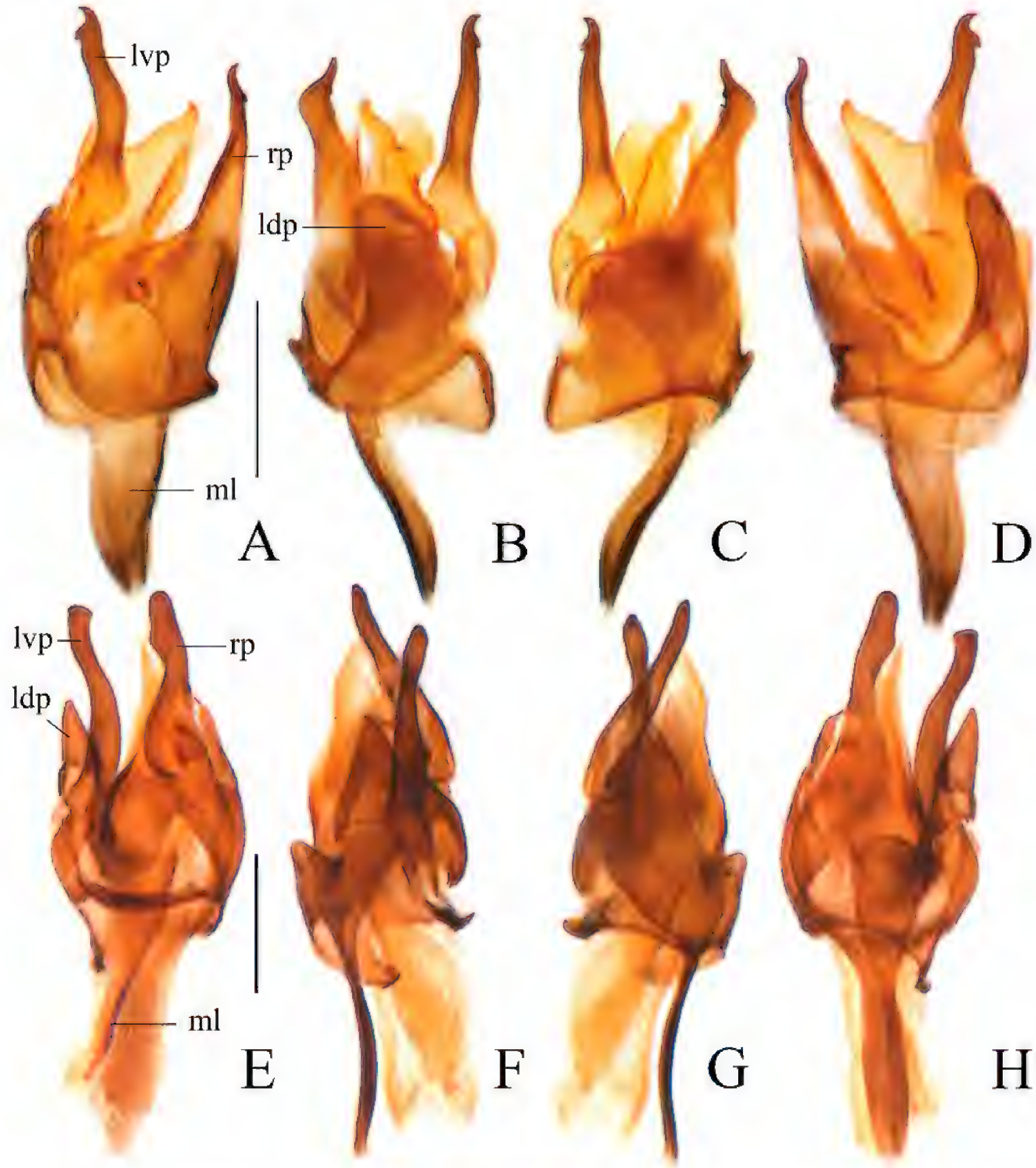

Figure 18. Aedeagi of *Microichthyurus* species. **A–D**. *M. guangxiensis* sp. nov.; **E–H**. *M. flavipennis* sp. nov. **A, E**. ventral views; **B, F**. right-lateral views; **C, G**. left-lateral views; **D, H**. dorsal views. Abbreviations: **ldp** – left dorsal paramere; **lvp** – left ventral paramere; **rp** – right paramere; **ml** – median lobe. Scale bars: 0.2 mm.

Male (Fig. 14C). Coloration. Body black, but yellow at clypeus, antennomeres I–III, scutellum, and apical half part and outer half part of elytra.

Eyes large, interocular distance about half as wide as diameter of an eye. Antennae extending to the middle of abdominal tergite II, antennomeres II about half length of I, III–X subequal in length and about half length of I, XI about 1.3 times longer than X.

Pronotum 1.1 times wider than long, anterior margin slightly arcuate, posterior margin bisinuate, lateral margins subparallel, anterior angles rounded, and posterior angles nearly rectangular. Elytra 1.3 times longer than wide, 2.3 times longer than pronotum, with lateral margins sinuate, sutures strongly dehiscent from the base, distance between sutures wider than width of the elytron, apices rounded.

Abdominal tergite VIII (Fig. 15B) about 1.3 times longer than wide, with lateral margins slightly arcuate, postero-lateral projections about 1/3 length of the tergite and arcuate at inner margins. Abdominal sternite VIII (Fig. 16B) bilobed, with lateral portions diverging posteriorly from each other, broadly fused at basal half part, each with a sharply hooked projection at apex, a triangular protuberance at middle of inner margin, surface coarsely punctate and covered with a few erected and stout setae in middle part. Proctiger (Fig. 17B) semicircular, almost surrounded by paraproct and covered with a few long pubescence on surface. Paraproct (Fig. 17B) semicircular and obviously bordered at lateral margins, slightly emarginate in middle of posterior margin, around which covered with long pubescence, with tergal flange long and about 3.5 times as long as paraproct, basal 1/3 part strongly broadened and nearly oval, nearly as long than wide, apical 2/3 part slender and bent inwards.

Aedeagus (Fig. 18E–H): left ventral paramere slender and bisinuate in dorsal and ventral views, rounded at apex (Fig. 18F, G); left dorsal paramere conical tube-shaped, short

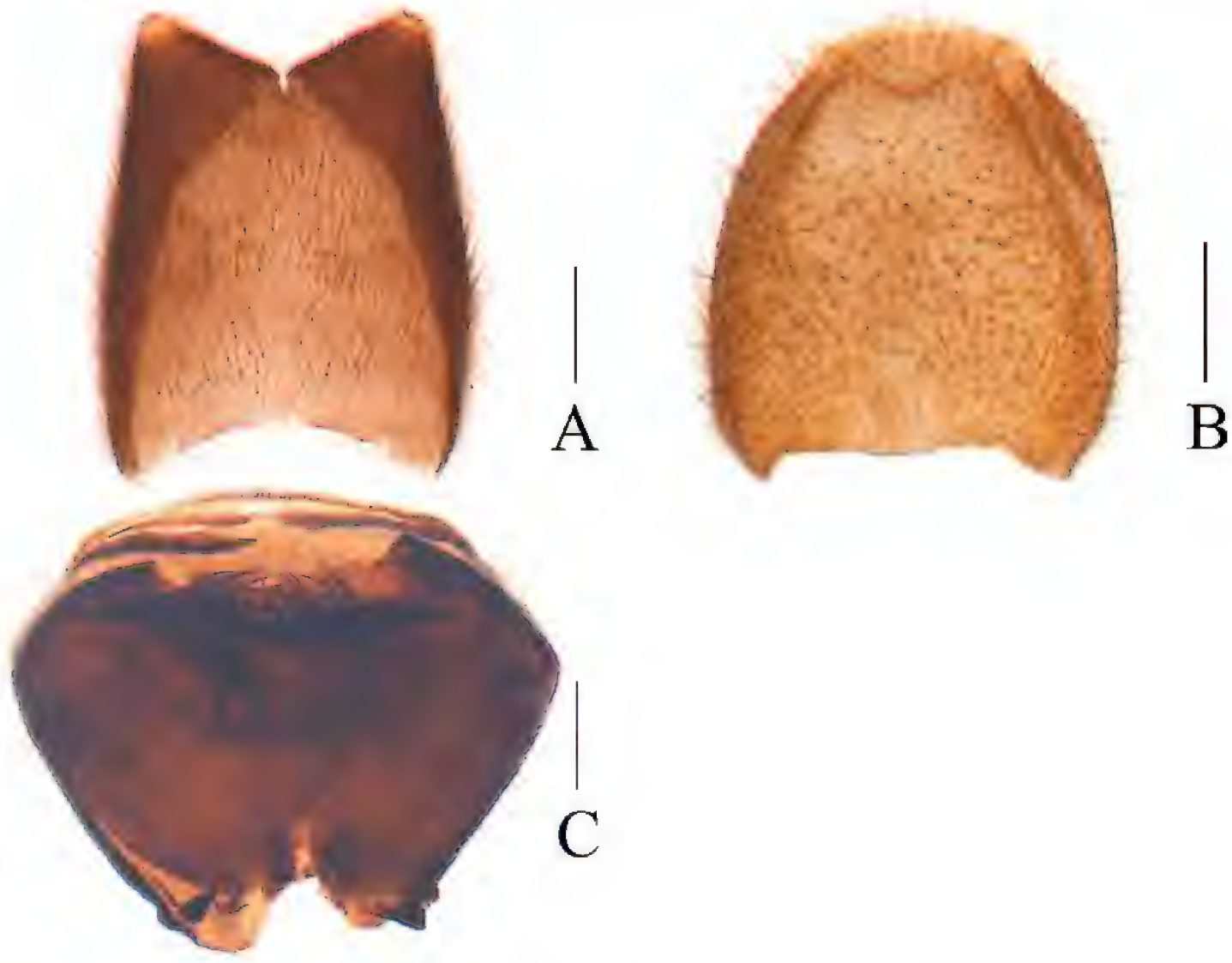

Figure 19. *Microichthyurus guangxiensis* sp. nov. **A**. abdominal tergite VIII of female, ventral view; **B**. abdominal sternite VIII of female, ventral view; **C**. abdominal sternite VII of male, ventral view. Scale bars: 0.2 mm.

and about 0.6 times length of left ventral paramere, pointed at apex (Fig. 18F); right paramere 1.1 times as long as left ventral paramere, narrowest in middle part, rounded at apex (Fig. 18E, H); median lobe moderately sclerotized and as long as parameres, lamellar at basal part and elongate-tube shaped at apical half, rounded at apex (Fig. 18F, G).

Female. Unknown.

Distribution. China (Guangxi).

Microichthyurus bimaculatus Y. Yang, Lin & Liu, sp. nov.

https://zoobank.org/69BF8079-F090-462B-BAFC-9FEAF808E0BA

Figs 15C, 16C, 17C, 20A, 21A–D

Etymology. The specific name is derived from the Latin *bi-* (two) and *macula* (spot), referring to its elytra with two black spots.

Type material. ***Holotype.*** China – Hainan Prov. • ♂; Baisha, Hongxin to Hongkan Reservoir; 516 m; 16-XI-2008; M.Y. Lin leg.; IZAS.

Diagnosis. The species can be easily distinguished from all other species of *Microichthyurus* by the characteristic body coloration, in which elytra mostly yellow, black at humeri, and having a pair of small oblong black spots on disc. Also, its aedeagus is distinctive, with median lobe long sac-shaped, longer than left ventral paramere.

Description. Body length: 5.2 mm; body width: 1.0 mm.

Male (Fig. 20A). Coloration. Body black, antennomeres I–IV yellow ventrally, prothorax yellow, pronotum with a large black marking in center of disc; scutellum yellow; elytra brown at the part which near pronotum posterior margin and yellowed posteriorly, with a pair of black oblong spots in the middle.

Eyes moderately large, interocular distance about 0.7 times as wide as diameter of an eye. Antennae extending to posterior margin of abdominal tergite IV, antennomeres II about 1/3 length of I, III about twice longer than II, IV–X subequal and about 1.5 times longer than III.

Pronotum 1.1 times wider than long, anterior margin slightly arcuate and posterior margin strongly bisinuate, lateral margins subparallel, anterior angles rounded, and posterior angles nearly rectangular. Elytra 1.2 times longer than wide, 1.7 times longer than pronotum, with lateral margins subparallel, sutures slightly dehiscent from the base, distance between sutures slightly wider than width of the elytron, apices rounded.

Abdominal tergite VIII (Fig. 15C) 1.3 times longer than wide, with lateral margins slightly arcuate, postero-lateral projections about half length of the tergite, and feebly sinuate at inner margins. Abdominal sternite VIII (Fig. 16C) bilobed, with lateral portions nearly inverted triangular, as long as wide, broadly fused at basal half part, inner apical angles rounded and outer apical angles acute, each with a finger-like projection in middle of posterior margin. Proctiger (Fig. 17C) semicircular, almost surrounded by paraproct and covered with a few long pubescence on surface. Paraproct (Fig. 17C) subsquare and slightly emarginate in middle and dentated on both sides of posterior margin, around which covered with long pubescence, with tergal flange long and about 4.2 times as long as paraproct, basal 1/4 part strongly broadened and rhombic, nearly as long than wide, apical 3/4 part slender and bent inwards.

Figure 20. Habitus of *Microichthyurus*, dorsal views. **A**. *M. bimaculatus* sp. nov.; **B**. *M. strictipennis* sp. nov. **A–B**. holotype males. Scale bars: 2.0 mm.

Aedeagus (Fig. 21A–D): left ventral paramere rod-like, slender, and progressively thinned apically, rounded at apex (Fig. 21A, D); left dorsal paramere short and lamellar, about half length of left ventral paramere, widely rounded at apical margin (Fig. 21B); right paramere rod-like, as long as and thicker than left ventral paramere, acute at apex (Fig. 21D); median lobe strongly sclerotized and 1.5 times longer than parameres, grooved at basal part, elongate sac-shaped at apical part, rounded at apex (Fig. 21A–D).

Female. Unknown.

Distribution. China (Hainan).

***Microichthyurus strictipennis* Y. Yang, Lin & Liu, sp. nov.**

https://zoobank.org/929A1EB8-C8AB-4F1F-926B-53EBF6CB2E9B

Figs 15D, 16D, 17D, 19C, 20B, 21E–H

Etymology. The specific name is derived from the Latin *strictus* (narrow) and *penna* (feather), referring to its elytra narrowed posteriorly.

Type material. ***Holotype.*** China – Hainan Prov. • ♂; Mingfenggu; 14-IV-2019; sweeping; Y.D. Chen. leg.; IZAS.

Paratype. China – Hainan Prov. • 1 ♂; same data as holotype; IZAS.

Diagnosis. The species resembles *M. villosipes* in the abdominal sternite VII with one bulge covered with long setae in male, but could be easily differentiated from the latter by the following characters: antennae normally filiform in male; mesofemora normally slender and tibiae without any longer hairs in male (Fig. 20B); aedeagus with left dorsal paramere as long as left ventral paramere (Fig. 21E–H). Unlike in *M. villosipes*, antennae are cylindrically thickened in male (Lin et al. 2024a: fig. 9a); mesofemora moderately swollen, and tibiae densely covered with slightly longer and erected hairs in male (Lin et al. 2024a: fig. 8a); aedeagus with left dorsal paramere long, 1.1 times longer than left ventral paramere (Lin et al. 2024a: fig. 6e, f).

Description. Body length: 4.3–4.4 mm (4.3 mm in holotype); body width: 1.0 mm (1.0 mm in holotype).

Male (Fig. 20B). Coloration. Body black, antennomeres I–II brown, elytra light brown at apical 1/3 part.

Eyes strongly large, interocular distance about 0.3 times as wide as diameter of an eye. Antennae extending to posterior margin of abdominal tergite II, antennomeres II about 1/3 length of I, III–V subequal in length and about twice longer than II, VI slightly shorter than V, VII–XI subequal in length and about 4/5 length of VI.

Pronotum 1.1 times wider than long, anterior margin slightly arcuate and posterior margin bisinuate, lateral margins subparallel, anterior angles rounded, and posterior angles nearly rectangular. Elytra 1.1 times longer than wide, 1.8 times longer than pronotum, with lateral margins slightly sinuate, sutures dehiscent from the base, tapered at apices.

Abdominal sternite VII (Fig. 19C) strongly widened posteriorly, bulging in middle of posterior part, coarsely punctate, and covered with long and stout setae. Abdominal tergite VIII (Fig. 15D) 1.5 times longer than wide, with lateral margins slightly arcuate, postero-lateral projections about 2/5 length of the tergite and nearly straight at inner

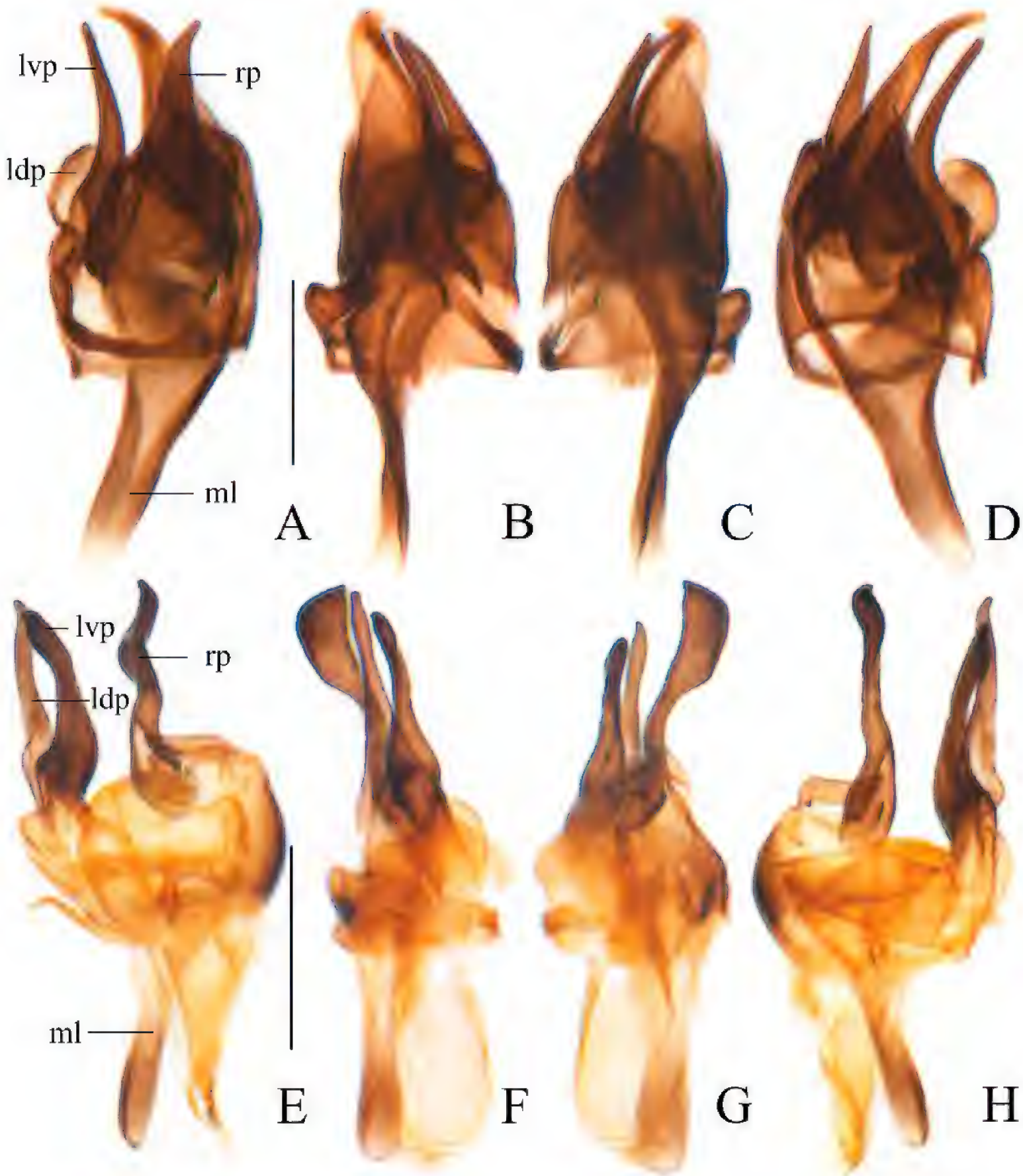

Figure 21. Aedeagi of *Microichthyurus* species. **A–D**. *M. bimaculatus* sp. nov.; **E–H**. *M. strictipennis* sp. nov. **A, E**. ventral views; **B, F**. right-lateral views; **C, G**. left-lateral views; **D, H**. dorsal views. Abbreviations: **ldp** – left dorsal paramere; **lvp** – left ventral paramere; **rp** – right paramere; **ml** – median lobe. Scale bars: 0.2 mm.

margins. Abdominal sternite VIII (Fig. 16D) bilobed, with lateral portions diverging posteriorly from each other, oval and 1.1 times longer than wide, surface coarsely punctate and covered with a few erected and stout setae in middle part, inner angles widely rounded and outer apical angles sharply projecting, outer apical angles surface covered with some short pubescence, each with a club-like projection in middle of apical margin, surface covered with some erected and stout setae in middle part. Proctiger (Fig. 17D) looking like bilobed, extending over paraproct. Paraproct (Fig. 17D) semicircular and roundly emarginate in middle of posterior margin, around which covered with a few long pubescence, with tergal flange long and about 3.5 times as long as paraproct, basal 1/3 part bifurcate, apical 2/3 part slender and nearly straight.

Aedeagus (Fig. 21E–H): left ventral paramere rod-like, feebly bisinuate, feebly hooked at apex (Fig. 21E, H); left dorsal paramere as long as left ventral paramere, moderately sinuate, thinnest in middle part, feebly hooked at apex (Fig. 21E, H); right paramere nearly as long as left ventral paramere, strongly twisted and spiral in ventral view, acute at apex (Fig. 21E), compressed laterally and distinctly broadened at apical part, axe-like in lateral view (Fig. 21F, G); median lobe moderately sclerotized and nearly as long as parameres, grooved at basal part, flattened sac-shaped, apex widely rounded (Fig. 21E, H).

Female. Unknown.

Distribution. China (Hainan).

Definition of the species groups

The species from China and adjacent areas (a total of 30 species) are subdivided into several species groups as follows.

Key to the species groups of *Microichthyurus*

1 Abdominal sternite VIII of male bilobed (e.g., Figs 2B, 16B–D), usually present with one or two pairs of slender processes; abdominal sternite VII of male usually with one or two bulges covered with large punctures and long setae (e.g., Fig. 19C), while simple in female ..... *M. minutulus* species group

– Abdominal sternite VIII of male trilobed (e.g., Figs 2D, 8, 16A), without any process; abdominal sternite VII simple in both sexes 2

2 Abdominal sternite VIII of male with lateral portions wide-triangular, nearly as wide as long (e.g., Fig. 2D); aedeagus: median lobe with a strongly sclerotized protrusion on ventro-lateral part (e.g., Fig. 4E–H) .... *M. flavicollis* species group

– Abdominal sternite VIII of male with lateral portions slender, at least twice as long as basal width (e.g., Figs 8, 16A); aedeagus: median lobe unlike above, without any protrusion on ventro-lateral part 3

3 Antennae simple filiform in both sexes; abdominal sternite VIII of male usually with axe-shaped lateral portions, about twice as long as basal width, terminally abruptly constricted into a small hook at apex (e.g., Fig. 16A) ..... *M. malthiniformis* species group

– Antennae cylindrically thickened in male, while simple in female (Figs 6, 11); abdominal sternite VIII of male with bull-horn-like lateral portions, at least 3.0 times as long as basal width, slightly hooked at apices (e.g., Fig. 8) ..... *M. quadratus* species group

The *Microichthyurus minutulus* species group

Diagnosis. Abdominal sternite VIII of male (e.g., Figs 2B, 16B–D; Brancucci 1983: figs 28–31, 1985a: fig. 2, 2009: fig. 23; Takahashi 2020: figs 5–7; Lin et al. 2024a: fig. 3b, 2024b: fig. 3G) bilobed (middle portion reduced or membranous), surface covered with large punctures and long setae, usually present with one or two pairs of slender processes. Abdominal sternite VII of male (e.g., Fig. 19C; Brancucci 1983: figs 28–31, 1985a: fig. 2; Takahashi 2020: figs 5–7; Lin et al. 2024a: fig. 8b) usually with one or two bulges covered with large punctures and long setae, while simple in female. Aedeagus (Figs 4A, B, 18E–H, 21; Brancucci 1983: figs 66–69, 1985a: fig. 3, 2009: Fig. 22; Takahashi 2020: figs 11–13; Lin et al. 2024a: fig. 6e–h, 2024b: fig. 4E–H): left dorsal paramere usually much longer than left ventral paramere, right paramere usually well-developed and slender, median lobe short, without any projection. Sometimes basal antennomeres (Fig. 1A, 20B; Lin et al. 2024a: fig. 9a) cylindrically thickened in male, while simple in female.

Included species. *M. minutulus* (Gestro, 1892), *M. pennatus* (Lewis, 1895), *M. okinawanus* Takahashi, 2020, *M. shimomurai* Brancucci 1983, *M. satoi* Brancucci 1983, *M. haennii* Brancucci 1983, *M. apicipennis* (Pic 1913a), *M. ilanensis* Brancucci 1985a, *M. arunensis* Brancucci, 2009, *M. robusticeps* Pic, 1923, *M. villosipes* Y. Yang, Liu & X. Yang, 2024a, *M. nigripes* Y. Yang, Lin & Liu, 2024b, *M. flavipennis* sp. nov., *M. bimaculatus* sp. nov., and *M. strictipennis* sp. nov.

Distribution (Fig. 22). China's Hainan Island, (Guangxi, Chongqing, Yunnan, Xizang), Taiwan Island, Japan, Laos, Vietnam, East Nepal.

Remarks. Brancucci (1983) provided an identification key for the species endemic to Taiwan Island (except for *M. ilanensis*), while Takahashi (2020) focused on the Japanese species. Additionally, Lin et al. (2024b) addressed those occurring in the Himalayan area. Here, all species are comprehensively reviewed and compared to present the following key.

Key to the species of the *Microichthyurus minutulus* species group

1 Abdominal sternite VII of male without any bulge 2

– Abdominal sternite VII of male usually with one or two bulges covered with large punctures and long setae (Fig. 19C; Brancucci 1983: figs 28–31, 1985a: fig. 2; Takahashi 2020: figs 5–7; Lin et al. 2024a: fig. 8b) 6

2 Head, pronotum and elytra with dark blue metallic luster (Fig. 1A, B); head width across eyes broader than pronotum (Fig. 1A, B) ..... *M. robusticeps* Pic, 1923

– Head and pronotum without blue metallic luster; head width across eyes narrower than pronotum 3

3 Abdominal sternite VIII of male with a pair of processes apically (Fig. 16B, C) 4

– Abdominal sternite VIII of male without any process (Brancucci 1983: figs 28–31; 1985a: fig. 2, 2009: fig. 23; Takahashi 2020: figs 5–7; Lin et al. 2024a: fig. 3b, 2024b: fig. 3G) 5

4 Pronotum uniformly black (Fig. 14C); elytra yellow at posterior half part and outer anterior part, without any black marking (Fig. 14C); abdominal sternite VIII of male (Fig. 16B) each side with a sharply hooked process at apical angle ..... *M. flavipennis* sp. nov.

– Pronotum bicolored, yellow with a large black marking in center of disc (Fig. 20A); elytra mostly yellow, with a pair of black oblong spots in middle (Fig. 20A); abdominal sternite VIII (Fig. 16C) of male, each side with a short and acute process near middle of posterior margin ..... *M. bimaculatus* sp. nov.

5 Elytra and legs bicolored and mixed with black and yellow; antennae normally filiform in male; abdominal sternite VIII of male (Brancucci 2009: fig. 23) with lateral portions knife-like and subequal in width along whole length ..... *M. arunensis* Brancucci, 2009
– Elytra and legs uniformly black (Lin et al. 2024b: fig. 2C); antennae feebly dorsoventrally flattened and widened in male (Lin et al. 2024b: fig. 2C); abdominal sternite VIII of male (Lin et al. 2024b: fig. 3G) with lateral portions axe-like and abruptly narrowed apically ..... *M. nigripes* Y. Yang, Lin & Liu, 2024
6 Antennae widened and flattened in male; mesofemora excavated ventrally at apical part in male (Brancucci 1983: figs 11, 12); abdominal sternite VII with two bulges in male (Brancucci 1983: figs 30, 31) 7
– Antennae normally filiform or cylindrically thickened in male; mesofemora normal and never excavated ventrally in male; abdominal sternite VII with a single bulge in male (Fig. 19C; Brancucci 1983: figs 28, 29, 1985a: fig. 2; Takahashi 2020: figs 5–7; Lin et al. 2024a: fig. 8b) 8
7 Antennomere XI slightly longer than X in male (Brancucci 1983: fig. 4); aedeagus: left dorsal paramere enlarged and truncate at apex (Brancucci 1983: fig. 68) ..... *M. shimomurai* Brancucci, 1983
– Antennomere XI about twice longer than X in male (Brancucci 1983: fig. 5); aedeagus: left dorsal paramere tapered at apex (Brancucci 1983: fig. 69) ..... *M. satoi* Brancucci, 1983
8 Aedeagus: left dorsal paramere slightly longer or as long as left ventral paramere or subequal in length (Fig. 21E–H; Lin et al. 2024a: fig. 6e–h) 9
– Aedeagus: left dorsal paramere 1.8–2.0 times longer than left ventral paramere (Brancucci 1983: figs 66, 67, 1985a: fig. 3; Takahashi 2020: figs 11–13) 10
9 Mesofemora normally slender and tibiae without any longer hair in male (Fig. 20B); abdominal sternite VIII of male with a pair of slender processes near latero-apical angles (Fig. 16D) ..... *M. strictipennis* sp. nov.
– Mesofemora moderately swollen, tibiae densely covered with slightly longer and erected hairs in male (Lin et al. 2024a: fig. 8a); abdominal sternite VIII of male with a pair of wide-triangular protuberances near middle of lateral margins (Lin et al. 2024a: fig. 3b) ..... *M. villosipes* Y. Yang, Liu & X. Yang, 2024
10 Abdominal sternite VIII with two pairs of processes in male (Takahashi 2020: fig. 7; Brancucci 1983: fig. 29) 11
– Abdominal sternite VIII with a pair of processes in male (Brancucci 1983: fig. 28, 1985a: fig. 2) 12
11 Aedeagus: left dorsal paramere tapered at apex (Takahashi 2020: fig. 13) ..... *M. pennatus* (Lewis, 1895)
– Aedeagus: left dorsal paramere enlarged and truncate at apex (Brancucci 1983: fig. 67) ..... *M. apicipennis* (Pic, 1913a)
12 Abdominal sternite VIII of male with the processes near middle of lateral margins (Takahashi 2020: figs 5, 6) 13
– Abdominal sternite VIII of male with the processes near latero-apical angles (Brancucci 1983: fig. 28, 1985a: fig. 2) 14
13 Abdominal sternite VIII of male with the processes distinctly dilated near apices (Takahashi 2020: fig. 5); aedeagus: left dorsal paramere curved near apex (Takahashi 2020: fig. 11) ..... *M. minutulus* (Gestro, 1906)
– Abdominal sternite VIII of male with the processes tapered apically (Takahashi 2020: fig. 6); aedeagus: left dorsal paramere fluent (Takahashi, 2020: fig. 12) ..... *M. okinawanus* Takahashi, 2020
14 Abdominal sternite VIII with latero-apical angles narrowly rounded at apices in male (Brancucci 1985a: fig. 2); aedeagus: left dorsal paramere slightly bent, at an angle of ca. 20° with its trunk (Brancucci 1985a: fig. 3) ..... *M. ilanensis* Brancucci, 1985
– Abdominal sternite VIII with latero-apical angles sharp at apices in male (Brancucci 1983: fig. 28); aedeagus: left dorsal paramere strongly bent, at an angle of ca. 90° with its trunk (Brancucci 1983: fig. 66) ..... *M. haennii* Brancucci, 1983

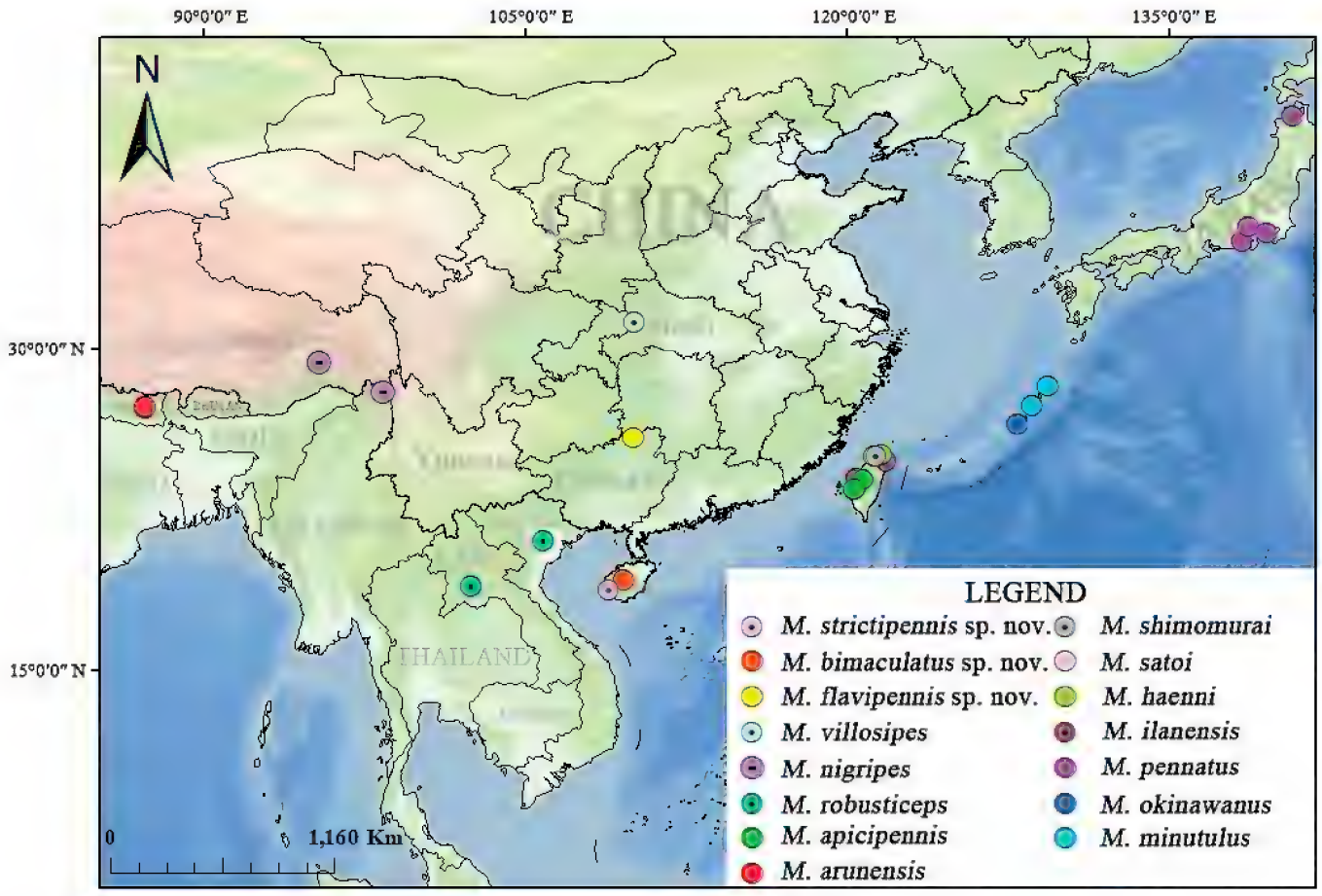

Figure 22. Distribution map of the *Microichthyurus minutulus* species group.

The *Microichthyurus flavicollis* species group

Diagnosis. Abdominal sternite VIII of male (Fig. 2D; Lin et al. 2024a: fig. 3a) trilobed, with middle portion well-developed and nearly rectangular, lateral portions nearly wide-triangular. Abdominal sternite VII simple in both sexes. Aedeagus (Fig. 4E–H; Lin et al. 2024a: fig. 6a–d): left ventral and right parameres slender and rod-like, left dorsal paramere slender and rod-like or short and lamellar, median lobe long cone-shaped at apical part, present with a strongly sclerotized protrusion on ventro-lateral part. Antennae simple filiform in both sexes.

Included species. *M. flavicollis* Y. Yang, Liu & X. Yang, 2024, *M. falcatus* sp. nov.

Distribution (Fig. 23). China (Guizhou, Yunnan).

Key to the species of the *Microichthyurus flavicollis* species group

1 Pronotum uniformly yellow (Lin et al. 2024a: fig. 2a, b); abdominal sternite VIII of male (Lin et al. 2024a: fig. 3a) with lateral portions rounded at latero-apical angles; aedeagus: median lobe present with a fork-shaped protrusion on ventro-lateral part (Lin et al. 2024a: fig. 6a)..... *M. flavicollis* Y. Yang, Liu & X. Yang, 2024

– Pronotum dark brown (Fig. 1C, D); abdominal sternite VIII of male (Fig. 2D) with lateral portions acute at latero-apical angles; aedeagus: median lobe present with a horn-shaped protrusion on ventro-lateral part (Fig. 4E, H) ..... *M. falcatus* sp. nov.

The *Microichthyurus malthiniformis* species group

Diagnosis. Abdominal sternite VIII of male (Fig. 16A; Brancucci 2009: figs 15–18; Lin et al. 2024a: Fig. 3c–d, 2024b: Fig. 3B) trilobed, with middle portion subquadrate, lateral portions usually slender and axe-shaped, at most twice longer than basal width, terminally abruptly constricted into a small hook at apex (except for *M. guangxiensis* sp. nov.). Abdominal sternite VII simple in both sexes. Aedeagus (Fig. 18A–D; Brancucci 2009: figs 12–14; Lin et al. 2024a: fig. 10a–h, 2024b: fig. 4A–D): left ventral and right parameres strongly twisted, usually bifurcate at apex or with a distinct projection on apical part, left dorsal paramere short and lamellar, which sometimes covered with a tuft of long hairs around apical margin, median lobe usually more or less protruding on latero-apical portions, and the protrusions stout. Antennae simple filiform in both sexes.

Included species. *M. malthiniformis* (Champion, 1924), *M. godavariensis* Brancucci, 2009, *M. tanguensis* Brancucci, 2009, *M. hubeiensis* Y. Yang, Lin & Liu, 2024, *M. elongatus* Y. Yang, Lin & Liu, 2024, *M. flavifemur* Y. Yang, Lin & Liu, 2024 & *M. guangxiensis* sp. nov.

Distribution (Fig. 24). China (Hubei, Guangxi, Yunnan, and Xizang), North India, Bhutan, and Central and East Nepal.

Key to the species of the *Microichthyurus malthiniformis* species group

1 Elytra uniformly black (Lin et al. 2024a: fig. 2A, B) ..... *M. flavifemur* Y. Yang, Lin & Liu, 2024

– Elytra bicolored, mostly black, and the apices yellow 2

2 Pronotum uniformly black 3

– Pronotum bicolored, mostly yellow and mixed with black markings in center of disc 4

3 Abdominal sternite VIII of male (Brancucci 2009: fig. 18) with lateral portions progressively narrowed apically, acute at apices; aedeagus: left ventral paramere acute at apex (Brancucci 2009: fig. 14)..... *M. tanguensis* Brancucci, 2009

– Abdominal sternite VIII of male (Fig. 16A) with lateral portions widened apically, rectangular at apices; aedeagus: left ventral paramere bifurcate at apex (Fig. 18A, D) ..... *M. guangxiensis* sp. nov.

4 Aedeagus: left ventral paramere with a distinct projection on apical part..... 5

– Aedeagus: left ventral paramere without any projection near apex 6

5 Abdominal sternite VIII of female (Brancucci 2009: fig. 19) 1.5 times longer than wide, widest in the middle; aedeagus: left ventral paramere with a long projection on apical half part (Brancucci 2009: fig. 12) ..... *M. malthiniformis* (Champion, 1924)

– Abdominal sternite VIII of female (Brancucci 2009: fig. 20) as long as wide, widest at the posterior 1/3 part; aedeagus: left ventral paramere strongly curved with a short projection on apical 1/3 part (Brancucci 2009: fig. 13)..... *M. godavariensis* Brancucci, 2009

6 Abdominal sternite VIII of male with middle portion narrowed apically and lateral portions about 3.0 times as long as basal width (Lin et al. 2024a: fig. 3d); aedeagus: left ventral paramere and right paramere acute at apices (Lin et al. 2024a: fig. 10e, h) ..... *M. elongatus* Y. Yang, Lin & Liu, 2024

– Abdominal sternite VIII with middle portion widened apically and lateral portions about twice as long as basal width (Lin et al. 2024a: fig. 3c); aedeagus: left ventral paramere and right paramere bifurcated at apices (Lin et al. 2024a: Fig. 10a, d)..... *M. hubeiensis* Y. Yang, Lin & Liu, 2024

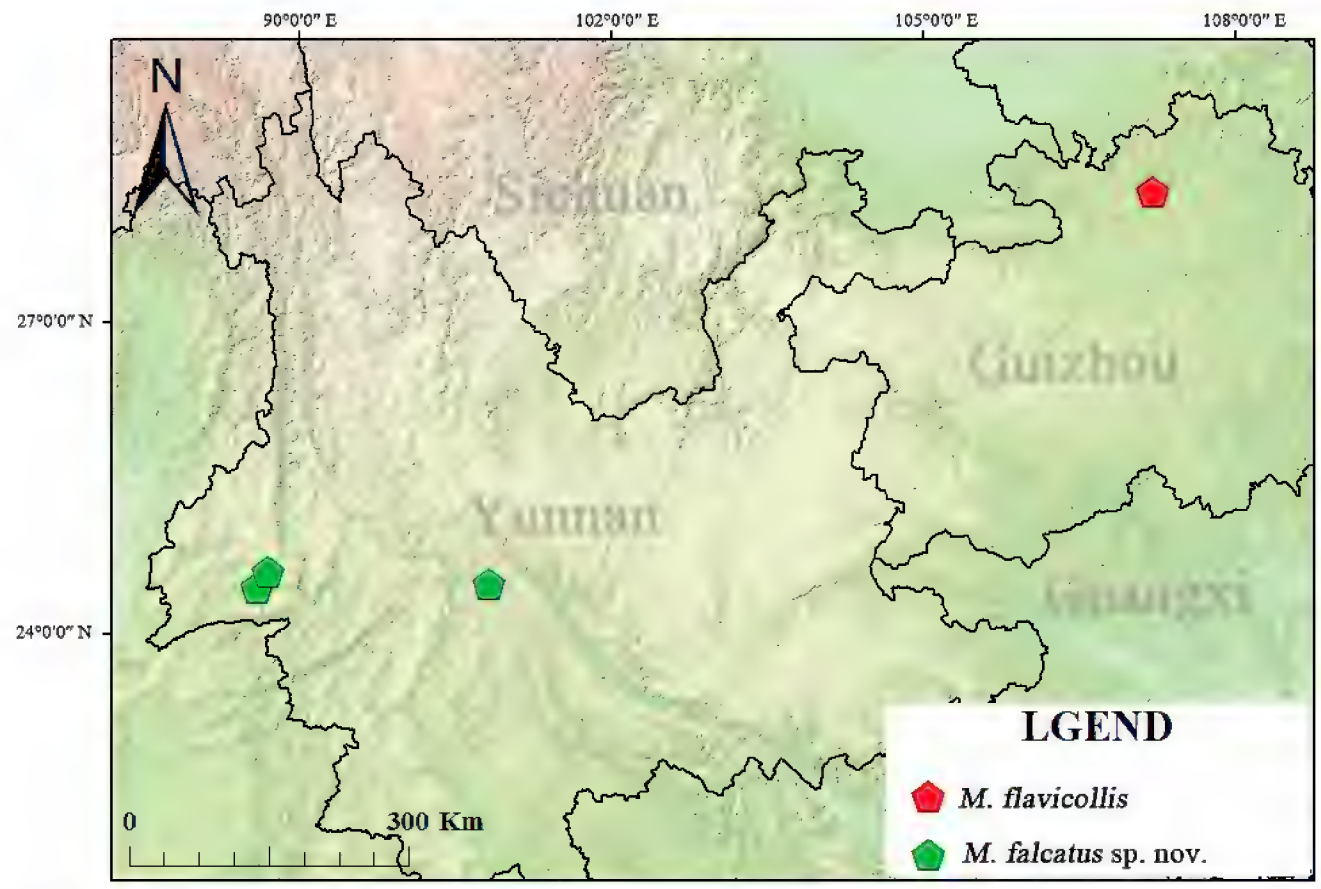

Figure 23. Distribution map of the *Microichthyurus flavicollis* species group.

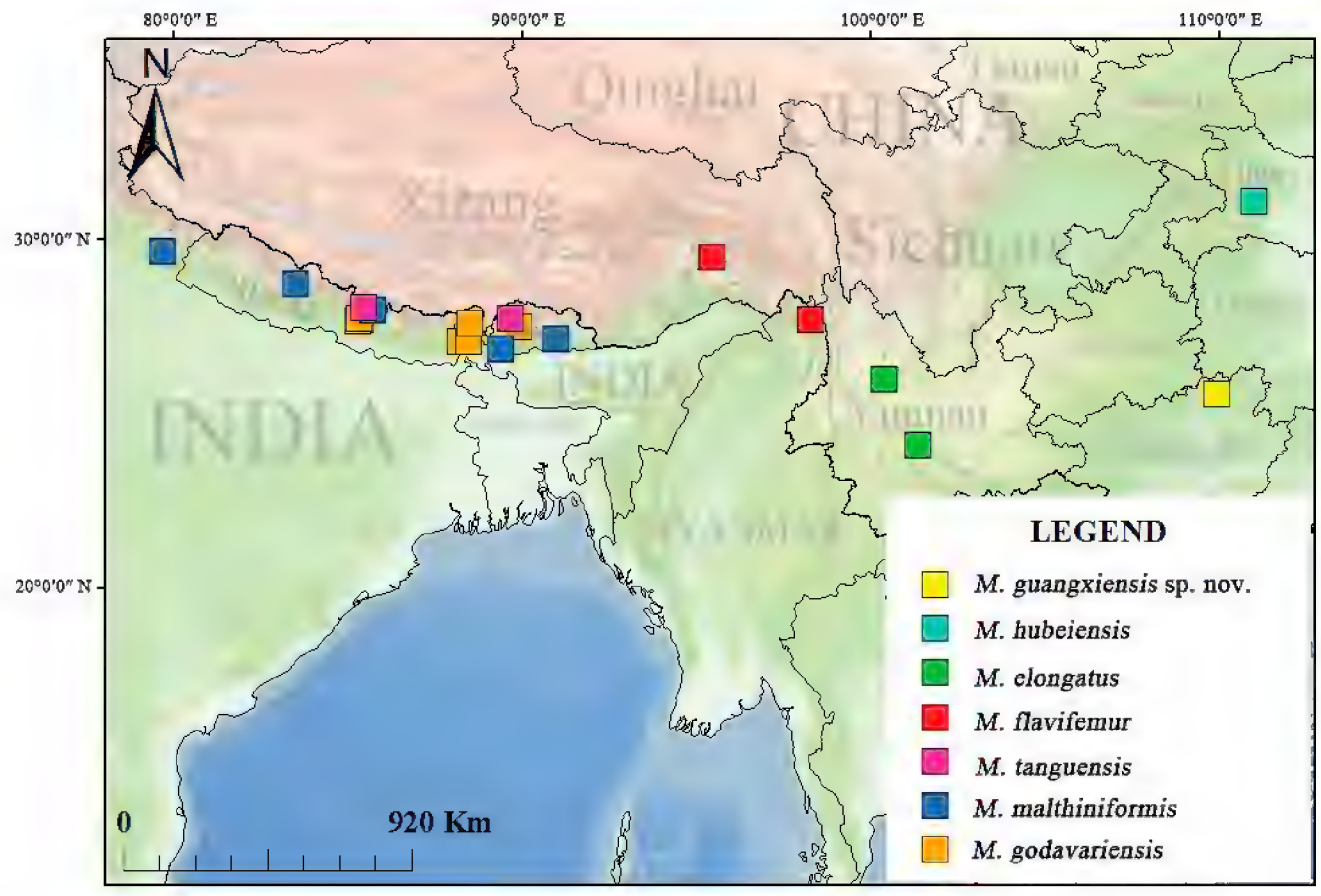

Figure 24. Distribution map of the *Microichthyurus malthiniformis* species group.

The *Microichthyurus quadratus* species group

Diagnosis. Abdominal sternite VIII of male (Fig. 8) trilobed, with middle portion nearly subquadrate, lateral portions bullhorn-like, slender, and at least 3.0 times as long as basal width, slightly hooked at apices. Abdominal sternite VII simple in both sexes. Aedeagus (Figs 10, 12): left ventral and right parameres slender and rod-like, more or less hooked at apices; left dorsal paramere short and lamellar; median lobe short sac-shaped at apical part, usually protruding on latero-apical portions, and the protrusions very slender. Antennae cylindrically thickened in male (Figs 6, 11A, C), while normally filiform in female (Fig. 11B, D).

Included species. *M. quadratus* sp. nov., *M. crassicornis* sp. nov., *M. niger* sp. nov., and *M. tertius* sp. nov.

Distribution (Fig. 25). China (Yunnan).

Key to the species of the *Microichthyurus quadratus* species group

1 Elytra bicolored, mostly black and dark brown at apices, femora, and bases of tibiae yellow (Fig. 6A); pronotum nearly as long as wide (Fig. 6A); abdominal sternite VIII of male with middle portion distinctly longer than wide, lateral portions diverging posteriorly (Fig. 8A) ..... *M. quadratus* sp. nov.

– Elytra uniformly black, femora black, at most yellow at bases, tibiae uniformly black (Figs 6B, 11); pronotum slightly wider than long; abdominal sternite VIII of male with middle portion feebly longer than or nearly as long as wide, lateral portions converging posteriorly (Fig. 8B–D) 2

2 Antennomeres II and III subequal in length and shortest, about half length of I in male (Fig. 6B); aedeagus: median lobe with latero-apical angles strongly protruding apically, both protrusion slender and nearly straight, subequal in length (Fig. 10E, H) ..... *M. crassicornis* sp. nov.

– Antennomeres III at least twice longer than II, slightly shorter than or as long as I in male (Fig. 11A, C); aedeagus: median lobe with latero-apical angles strongly or slightly protruding apically, one protrusion slender and bent, much longer than the other (Fig. 12) 3

3 Basal antennomeres distinctly thickened and III longest in male (Fig. 11C); aedeagus: right paramere slightly beak-shaped at apex (Fig. 12E–H) ..... *M. tertius* sp. nov.

– Basal antennomeres slightly thickened and I longest in male (Fig. 11A); aedeagus: right paramere tapered at apex (Fig. 12A–D) ..... *M. niger* sp. nov.

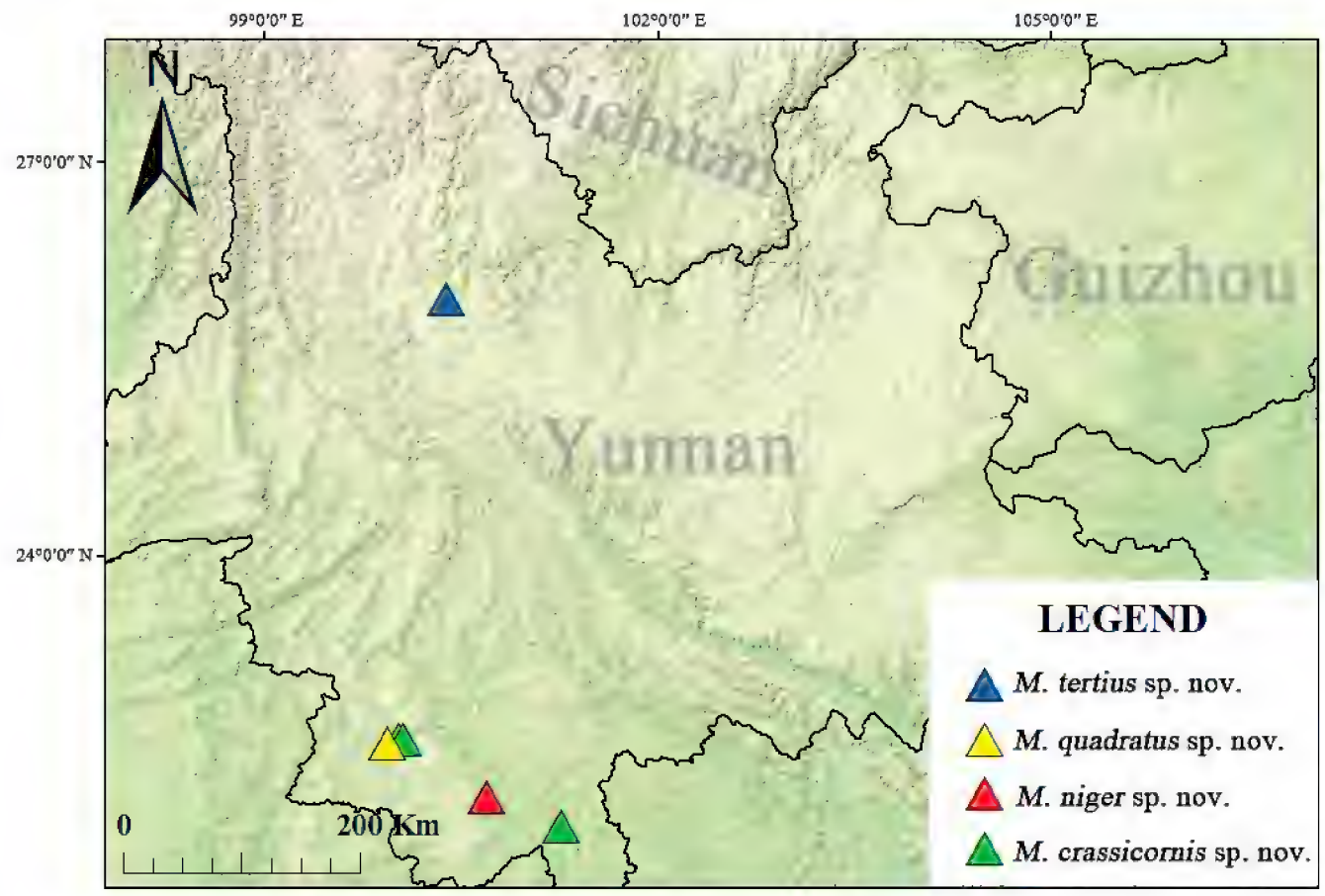

Figure 25. Distribution map of the *Microichthyurus quadratus* species group.

Species with unclear systematic position

The following two species remain unclear in their systematic position because of their poorly known morphology in the original publications.

Microichthyurus coomani (Pic, 1928)

Trypherus coomani Pic, 1928: 232.
Microichthyurus coomani: Brancucci, 1985b: 296.

Distribution. Vietnam (Tonkin).

Remarks. According to the original description (Pic 1928), this species could be differentiated from others by the swollen mesotibiae in male, which are bent at the apex.

Microichthyurus concoloripennis Pic, 1939

Microichthyurus concoloripennis Pic, 1939: 168.

Distribution. Vietnam (Tonkin).

Remarks. According to the original description (Pic 1939), this species could be differentiated from others by uniformly black elytra, black legs, and grayish colour at coxae, trochanters, and base of tibiae.

A checklist of *Microichthyurus* species from Sundaland area and S. India

Microichthyurus albonotatus Pic, 1921

Microichthyurus albonotatus Pic, 1921: 10.
Microichthyurus albonotatus var. *submarginata* Pic, 1937: 140.

Distribution. Sumatra, Borneo.

Microichthyurus apiceincrassatus Wittmer, 1941

Microichthyurus apiceincrassatus Wittmer, 1941: 216.

Distribution. Philippines (Samar).

Microichthyurus atripennis Pic, 1924

Microichthyurus atripennis Pic, 1924: 730.

Distribution. Philippines (Luzon).

***Microichthyurus baguionus* Pic, 1924**

Microichthyurus baguionus Pic, 1924: 730; Wittmer, 1941: 211.

Distribution. Philippines (Luzon).

***Microichthyurus bakeri* Pic, 1924**

Trypherus bakeri Pic, 1924: 731.
Trypherus bakeri var. *atrithorax* Pic, 1924: 731.
Microichthyurus bakeri Brancucci, 1985b: 296.

Distribution. Philippines (Basilan, Mindanao).

***Microichthyurus basipennis* Pic, 1936**

Microichthyurus basipennis Pic, 1936: 57.

Distribution. Peninsular Malaysia.

***Microichthyurus bicoloripennis* Pic, 1924**

Microichthyurus bicoloripennis Pic, 1924: 730; Wittmer, 1941: 211.

Distribution. Philippines.

***Microichthyurus brevicollis* Pic, 1921**

Microichthyurus brevicollis Pic, 1921: 10.

Distribution. Indonesia (Java).

***Microichthyurus brunneus* Wittmer, 1941**

Microichthyurus brunneus Wittmer, 1941: 214.

Distribution. Philippines (Luzon).

***Microichthyurus cephalotes* Pic, 1921**

Microichthyurus cephalotes Pic, 1921: 10.

Distribution. Indonesia (Sumatra).

***Microichthyurus corporaali* Pic, 1921**

Microichthyurus corporaali Pic, 1921: 10.
Microichthyurus corporaali var. *diversa* Pic, 1921: 10.

Distribution. Indonesia (Sumatra).

***Microichthyurus cyanicollis* Wittmer, 1941**

Microichthyurus cyanicollis Wittmer, 1941: 212.

Distribution. Philippines (Mindanao, Panao).

***Microichthyurus diversicornis* Pic, 1943**

Microichthyurus diversicornis Pic, 1943a: 2.

Distribution. Peninsular Malaysia.

***Microichthyurus excavaticeps* Pic, 1921**

Microichthyurus excavaticeps Pic, 1921: 10.

Distribution. Indonesia (Sumatra).

***Microichthyurus favrei* (Pic, 1913)**

Trypherus favrei Pic, 1913b: 183.
Microichthyurus favrei: Brancucci, 1985b: 296.

Distribution. S. India.

***Microichthyurus floresensis* Wittmer, 1954**

Microichthyurus floresensis Wittmer, 1954a: 27.

Distribution. Indonesia (Flores).

***Microichthyurus impressicollis* Pic, 1919**

Microichthyurus impressicollis Pic, 1919: 14.

Distribution. Indonesia (Lombok).

***Microichthyurus impressopygus* Pic, 1921**

Microichthyurus impressopygus Pic, 1921: 11.

Distribution. Indonesia (Sumatra).

***Microichthyurus inimpressus* Wittmer, 1939**

Microichthyurus inimpressus Wittmer, 1939: 158.

Distribution. Indonesia (Java).

***Microichthyurus latopygus* Pic, 1921**

Microichthyurus latopygus Pic, 1921: 11; 1927: 64.
Microichthyurus latopygus var. *inobscura* Pic, 1921: 11.
Microichthyurus latopygus var. *obscurus* Pic, 1927: 46 (misspelling).

Distribution. Indonesia (Sumatra).

***Microichthyurus limbatus* Pic, 1943**

Microichthyurus limbatus Pic, 1943b: 10.

Distribution. Borneo.

***Microichthyurus longepygus* Pic, 1921**

Microichthyurus longepygus Pic, 1921: 11.
Microichthyurus longepygus var. *diversicolor* Pic, 1921: 11.

Distribution. Indonesia (Sumatra).

***Microichthyurus maculicollis* Wittmer, 1941**

Microichthyurus impressicollis Wittmer, 1941: 214.

Distribution. Philippines (Samar)

***Microichthyurus medioincrassatus* Wittmer, 1941**

Microichthyurus medioincrassatus Wittmer, 1941: 215.

Distribution. Philippines (Samar)

***Microichthyurus montanus* Wittmer, 1954**

Microichthyurus montanus Wittmer, 1954b: 80.

Distribution. Philippines (Luzon).

***Microichthyurus neglosensis* Wittmer, 1978**

Microichthyurus neglosensis Wittmer, 1978: 85, fig. 3–4.

Distribution. Philippines (Negros).

***Microichthyurus nilgiriensis* Wittmer, 1957**

Microichthyurus nilgiriensis Wittmer, 1957: 574.

Distribution. S. India.

***Microichthyurus pilicornis* Wittmer, 1941**

Microichthyurus pilicornis Wittmer, 1941: 213.

Distribution. Philippines (Luzon).

***Microichthyurus robustus* Pic, 1919**

Microichthyurus robusticeps Pic, 1919: 14.

Distribution. Philippines (Palawan).

***Microichthyurus rossi* Wittmer, 1957**

Microichthyurus rossi Wittmer, 1957: 574.

Distribution. Philippines (Mindoro).

***Microichthyurus singularicornis* Pic, 1921**

Microichthyurus singularicornis Pic, 1921: 11.
Microichthyurus singularicornis var. *differens* Pic, 1921: 11.

Distribution. Indonesia (Sumatra).

***Microichthyurus sublateralis* (Motschulsky, 1859)**

Biurus sublateralis Motschulsky, 1859: 61.
Microichthyurus sublateralis: Wittmer, 1972: 121.

Distribution. Sri Lanka.

***Microichthyurus sylvicola* (Motschulsky, 1859)**

Biurus sylvicola Motschulsky, 1859: 60.
Microichthyurus sylvicola: Wittmer, 1972: 121.

Distribution. Sri Lanka.

***Microichthyurus uniimpressus* Wittmer, 1939**

Microichthyurus uniimpressus Wittmer, 1939: 156.

Distribution. Indonesia (Java).

***Microichthyurus zehntneri* (Gestro, 1897)**

Ichthyurus zehntneri Gestro, 1897: 219; 1906: 269.
Microichthyurus zehntneri: Wittmer, 1939: 157; 1942: 610.
Microichthyurus basiciliatus Pic, 1937: 145; Wittmer, 1942: 610; 1948: 172.
Microichthyurus lasiciliatus: Wittmer (nec Pic, ex errore), 1939: 157.

Distribution. Indonesia (Java).

Discussion

With the addition of the new species reported in this study, the total number of *Microichthyurus* species has increased to 65. Among these species, 33 species are distributed in the Sundaland area (Delkeskamp 1977; Wittmer 1978; Brancucci 1985b), while two are found in South India (Delkeskamp 1977; Brancucci 1985b). The remaining ones inhabit Japan (Takahashi 2020), China (Brancucci 1983, 1985a, 1985b; Lin et al. 2024a, 2024b), and Bhutan, Nepal, and northern India (Brancucci 2009). In our recent studies (Lin et al. 2024a, 2024b) and the present work, we have concentrated on the species within the Chinese fauna and its neighboring regions. As noted in our preceding publication (Lin et al. 2024b), *Microichthyurus* includes several different lineages, which can be distinguished by variations in the morphology of male abdominal sternite VII and VIII, aedeagus structure, and antennae characteristics. To enhance the taxonomy of this genus further, we have endeavored to subdivide these species (excluding those species from the Sundaland area and South India) into several species groups, as defined in the aforementioned part.

Among the defined species groups, the *M. flavicollis* species group (including 2 species), the *M. malthiniformis* species group (7 species), and the *M. quadratus* species group (4 species) are quite well defined because of their consistent morphological characters among the members within each respective group. In contrast, the *M. minutulus* species group (a total of 15 species) exhibits considerable morphological heterogeneity. Interestingly, the species restricted to the islands (Japan, Taiwan, and Hainan) are consistent in their morphology, while those in the Asian mainland are diverse in their characters. Compared with those species endemic to the islands, most mainland species (except for *M. flavipennis* sp. nov.) do not have any process in their male abdominal sternite VIII. However, similar to their island counterparts, they are consistently characterized by large punctures and long setae on male abdominal sternite VIII. Furthermore, only one mainland species, *M. villosipes*, has one bulge in the male abdominal sternite VII, whereas those species from islands always have one or two bulges. Moreover, some mainland species are similar in morphology of the aedeagus to those located in the islands. Notably, these species possess the left dorsal paramere that is significantly longer than the left ventral paramere, such as *M. robusticeps*, *M. arunensis*, and *M. nigripes*. Additionally, some species exhibit similarity in the shape of their antennae, such as *M. robusticeps* (located in Laos and Vietnam) and *M. shimomurai* (endemic to Taiwan Island). Considering the similarities among the species, we suggest placing all species with bilobed male abdominal sternite VIII into a single species group at the moment. It is hypothesized that these species share a recent common ancestor and have differentiated as a result of their geographical separation. The mainland species are quite diverse, probably due to the high heterogeneity of their habitats and interactions with other species originally occurring in those regions. Nonetheless, more materials, particularly from the Sundaland area, are required to thoroughly improve the classification of *Microichthyurus*, and molecular phylogenetic analyses will be necessary to validate the findings of the present study in future research.

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